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Studies in the Genus Pleospora. II.

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In a previous paper the writer (14) has discussed the position and relationships of the collections of *Pleospora* with three-septate spores, which he has studied. In two earlier papers (12, 13) on this genus, three developmental series, the leptosphaeroid, vulgaris and herbarum, were recognized. When examined more closely these "series" are seen to be based upon three types of septation and in actual collections some may be found which have two or even all three methods of wall formation represented in some spores.

The present paper deals with a large number of collections within the area of the five- to seven-septate spore group which shows the origin of the vulgaris and herbarum series. Collections showing these spore types are the most common, widely distributed, and variable, of any within the genus, and therefore, the most difficult when it comes to species delimitation. They will, therefore, be considered as a unit. Only those collections with smooth or slightly tomentose perithecia will be considered in this paper. Those collections with densely tomentose or setose perithecia, often placed in the genus *Pyrenophora* form a somewhat parallel series and will be considered separately.

In order to understand the insertion of septa in the spore it is necessary to have some standard terminology. In the following discussions (see Fig. 1) the first three septa, formed in all spores, will be referred to as the upper (a_1), central (a_2), and lower (a_3) primary septa. The septa (b_1, b_2, b_3, etc.) inserted in the four cells so formed, will be referred to as secondary septa. Septa (c) inserted between a primary and a secondary septum, will be referred to as tertiary septa. Cells so delimited can also be spoken of as primary, secondary or tertiary, and as end, penultimate, antipenultimate or central cells as regards position.

A list of collections, referred to in the body of the paper by number only, is appended to this paper. These are in numerical order as listed in the author's records. Host forms and varieties as commonly used in exsiccati are not listed unless they are of special interest for, as Tables 1–4 will show, there is little or no correlation between morphologic characters and host occurrence.

The vulgaris series is easily derived from such three-septate species as *P. oligostachyeae* or *P. diaporthoides*, by the insertion of a secondary vertical and transverse septum in each of the two central cells. This type of septation has undoubtedly arisen at various times and places. The two extra septa are found in varying percentage of the spores of different collections. *P. boldoae* and *P. lactucicola*, discussed in a previous paper (14) represent species in which this type of septation occurs in an irregular and occasional fashion. Immature spores of normally five-septate species may also be confused with three-septate species, for there is an irregular and progressive insertion of the septa as the spores mature.

The herbarum series is distinguished by the insertion of vertical septa in the end cells, although other secondary characters may be associated with this. Such vertical division of the end cells occasionally occurs in three-septate spores as those of *P. diaporthoides* and *P. lactucicola* (14), but they appear for the most part in spores with five or more septa.

The very common occurrence and great variation of collections in this five- to seven-septate group, makes it necessary to delimit species in a purely arbitrary fashion. Occasional collections are found which have spores of a rather distinct form, color or septation, tempting one to base specific distinctions upon such differences. On the other hand, many collections can be found which overlap such distinctive ones in many different ways. An examination of a large number of collections gives a smooth series of overlapping variations which obscure such sharp distinctions and make it difficult to distinguish specific groups and impossible to draw sharp specific lines. Tables 1–4, which have collections possessing spores of similar form and septation arranged according to spore size, illustrate this variation as regards this character. There is here a continuous series of overlapping ranges of spore size covering spores (with 5 to 7 septa) from 14×6 to $60 \times 26\mu$. A similar situation arises as regards almost any unit character and there is little or no correlation between characters, i.e., spores of any size form or septation may show all degrees of color intensity from yellow-brown to dark red-brown; or may be found in either large or small, or smooth, tomentose or setose perithecia.

There can be discerned, however, a greater correlation between certain groups of characters than between other groups, i.e., smaller spores usually have fewer septa; spores with rounded ends are more likely to have vertical walls in the end cells; and larger spores in smaller perithecia are more likely to be dark red-brown. Such rather indefinite correlations reveal certain lines of development and the species groups have been centered about these in this account. These species, however, cannot be sharply delimited. There will always be found collections of an intermediate type which must be arbitrarily placed. *This situation cannot be avoided.*

These theoretical distinctions and the arbitrary limitations of these groups are given here so that they may serve as a basis of discussion.

Pleospora vulgaris: has spores which are five-septate (or three-septate in immature spores). The end cells have no vertical septa.

The spore is usually inaequilateral or slightly curved and with bluntly tapered ends. The end cells are usually longer than the four central cells.

Pleospora media: differs only in the presence of vertical walls in the end cells. The percentage of such spores with vertically septate end cells varies with the collection, but if more than 10% of the spores show it, the collection is placed in this species. The collections placed here are intermediate between *P. vulgaris* and *P. herbarum* and the spore form varies between those given for these two species. The same is true as regards septation, for both five- and seven-septate spores occur here. This species is set off arbitrarily from *P. herbarum* by the size of the spore (28 μ or less).

Pleospora herbarum: is set apart from both *P. media* and *P. armeriae* largely upon the basis of the size of the spore, including those collections which show some spores above 28 μ but all below 40 μ in length. With the increase in length the spore tends to become straighter but asymmetric and with more rounded ends. The upper portion becomes shorter, broader and more rounded, whereas the lower portion becomes longer, narrower and more tapered.

Pleospora armeriae and P. balsamorrhizae: These two species include the collections with the larger seven-septate spores, over 40 μ in length, and show certain other correlated characters.

In addition to this series of increasing spore size, there can be distinguished certain other effects of habitat and climate. Collections from higher altitudes and latitudes show an ecologic series which tend to have darker, red-brown spores, smaller perithecia and more tomentum or setae upon these perithecia. This ecologic series can be seen to overly the series of spore sizes, i.e., collections of this type can be found in the ranges of *P. vulgaris, P. media, P. herbarum* and *P. balsamorrhizae.* Likewise, those collections found on woody stems show certain correlated characters which are the same no matter what the spore size, form or septation may be. These differences allow for the recognition of additional varieties and species within the above framework.

THE PLEOSPORA VULGARIS – PLEOSPORA RICHTOPHENSIS GROUP

These are the species of the vulgaris series with five-septate spores. The spores differ from those of the herbarium series in the lack of any vertical septa in the end cells. This series continues through species having spores with seven or more septa, but these will be considered in a later paper, as the present one is concerned merely with the confusing complex from which these varying lines diverge.

Table 1 gives data concerning these collections with five-septate spores lacking vertical walls in the end cells. It will be seen that there is an overlapping series of spore measurements for individual collections from those with spores 14–18 × 6–7 to those which are 35–44 × 14–17 μ. As concerns spore color, the darker red brown spores tend to be larger than the yellow brown ones, but this does not hold in all cases. There is a general, but not complete, correlation between the size of the spores and the size of the asci. Perithecial size seems to be affected more by habitat or environmental conditions, than any correlation with other characters. The collections with darker colored spores and more tomentose perithecia, usually come from higher altitudes or latitudes.

P. infectoria and *P. socialis* have small yellow-brown ascospores, but are otherwise based largely upon perithecial arrangement and might be looked upon as habitat variations. The remaining collections are broken into two species groups, arbitrarily, upon the size of the spores, those with spores less than 25 μ in length being placed in *P. vulgaris*, and those with spores all over 25 μ long, in *P. richtophensis*. The color of the ascospore, in both species, is used as a basis of varietal separation.

PLEOSPORA INFECTORIA Fck. Symb. Myc. 132. 1870.

Figs 2–3

Perithecia 150–300 (500) μ in diameter, globose or somewhat flattened; walls 10–20 μ thick, of black parenchyma, clustered in small longitudinal groups beneath the epidermis and erupment as small cylindric ostioles through a slit in this tissue which exposes the blackened surface of the perithecia and cortex and appears on the surface as a small (0.5–1 mm.) fusoid elongate blackened spot.

Asci cylindric-clavate with a slightly thickened wall and a claw-like base, 60–100 × 10–13 μ.

Spores overlapping uniseriate to biseriate, fusoid-ellipsoid, 5-septate, yellow-brown, symmetric or somewhat asymmetric with a broader upper and more tapered lower portion, usually inequilateral or slightly curved, ends bluntly tapered or rounded, constricted at the central and often at the secondary septa, vertical septa in all central cells but not in the end cells, 15–20 (23) × 5.5–7 μ.

Collections: *53* (Isotype), *55*, *331*, *333*, *342*, *440*, *449a*, *480* on *Avena*, *Lolium*, *Melica* and *Secale*, Austria, Germany, Czechoslovakia, Italy, Sweden.

DESCRIPTION OF FIGURES

FIG. 1. Diagrammatic spore to illustrate terminology used in referring to spore septation. a—primary septa; b—secondary septa; c—tertiary septa. FIG. 2–59. Ascospores of various collections, chosen to show variation within species and distinctions between species. All spores were drawn with a camera lucida to scale. Binomials used are those originally applied to each collection. FIG. 2. Spores of collection (*53*) of *Pleospora infectoria* Fck. (isotype). FIG. 3. Spores of an undetermined collection (*331*) belonging in *P. infectoria*. Fig. 4. Spores of a collection (*50*) of *P. socialis* Kze. (isotype). FIG. 5. Spores of a collection (*349*) of *P. vulgaris* Niessl, of the var. *vulgaris*. FIG. 6. Spores of a collection of *P. spegazziniana* Sacc. (56). FIG. 7. Spores of a collection (*79*) of *P. compositarum* Earle. FIG. 8. Spores of a collection (*62*) of *P. vulgaris* Niessl, of the var. *ferruginea*. FIG. 9. Spores of a collection (*59*) of *P. minuta* Kirschs. (type). FIG. 10. Spores of a collection (*51*) of *P. infectoria* var. *myricariae* Ade. FIG. 11. Spores of a collection (*260*) of *P. richtophensis* E. & E. FIG. 12. Spores of a collection (*267*) of *P. richtophensis* E. & E. FIG. 13. Spores from a collection (*258*) of *P. colla* Clem. inedit. FIG. 14. Spores from a collection (*80*) of *P. misera* Speg. (type). FIG. 15. Spores of a collection (*534*) of *P. richtophensis* var. *pallida* Wehm. FIG. 16. Spores from a collection (*71*) of *P. spinosella* Rehm (isotype). FIG. 17. Spores from an undetermined collection (*442*) placed in *P. media* var. *acuta*. FIG. 18. Spores from a collection (*170*) of *P. oblongata* Niessl. FIG. 19. Spores from a collection (*536*) of *P. richtophensis* var. *pallida* (type of var.). FIG. 20. Spores from a collection (*76*) of *P. Inulae-candidae* Jaap (type). FIG. 21. Spores from a collection (40a) of *P. oblongata* Niessl. FIG. 22. Spores from a collection (*177*) of *P. herniariae* Fck. (isotype). FIG. 23. Spores from a collection (*184*) of *P. syringae* Fck. (isotype).


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Berlese (2, *P. 11*) gives *P. vulgaris* and *P. socialis* as synonyms of *P. infectoria*, which may be correct, for it is possible that these are all host forms of the same species. *P. infectoria* is given, however, as forming small elongate slit-like pustules, which is characteristic of a number of collections with small spores, on grasses, and is well illustrated by Fuckel's type collection (*53*). The binomial *P. vulgaris* is retained here for the large number of collections on other hosts which do not show this character.

PLEOSPORA SOCIALIS Niessl & Künze, Verhandl. nat. Ver. Brünn *14:* 186. 1876.

Fig. 4

Perithecia 200–300 μ in diameter, somewhat flattened spheric, thickly scattered or crowded and completely immersed, beneath blackened areas of the surface host tissues, appearing on the surface as blackened spots, 1–10 × 1–4 mm. with papillate erpument ostioles. Walls 15–20 μ thick of dark brown parenchyma.

Asci clavate to cylindric-clavate, 75–95 × 10–11 μ, wall somewhat thickened, base claw-like.

Spores biseriate to overlapping uniseriate, fusoid-ellipsoid to ellipsoid, yellow-brown, 3- to mostly 5-septate, straight or somewhat inequilateral or curved, ends bluntly tapered or rounded, symmetric or somewhat more tapered below, vertical walls in any or all central cells, but not in the end cells, constricted at the central septum, rarely at the secondary septa, 14–18 × 6.5–7 μ.

Collections: *50*, on *Allium cepa*, from Saxony. (Isotype).

This species is known only from the type collection, which, as Niessl states (6, p. 186), is made up largely of *P. herbarum*, and some of the exsiccati taken from it show only this species. As Niessl also states (l.c.) the spores of this species are the same as those of *P. infectoria* and *P. vulgaris*. It differs only in the heavy spot-like blackening of the surface of the host and may be merely a habitat variety. Further collections are needed to test this possibility.

PLEOSPORA VULGARIS Niessl. Verhandl. nat. Ver. Brünn *14:* 187. 1876.

Figs. 5–10, 14

Perithecia 150–350 μ in diameter, spheric or flattened, rather scattered, erumpent as small papillate ostioles, occasionally causing small blackened spots, smooth or more or less tomentose, walls rather thick, 20–50 μ, of dark celled parenchyma.

Asci clavate to cylindric-clavate, wall thickened above, base claw-like 75–90 (120) × 10–20 (23) μ.

Spores biseriate, rarely overlapping uniseriate, fusoid-ellipsoid to ellipsoid, yellow-brown or red-brown, straight or usually somewhat inequilateral or somewhat curved, mostly symmetric, sometimes more tapered below, ends rather bluntly tapered or broadly rounded, 3- to mostly 5-septate, with vertical walls in any or all of the central cells but not in the end cells, constricted at the central septum and commonly so at the secondary septa, 14–23 (28) × 6–10 (11) μ.

The collections included here in *P. vulgaris* probably represent a large collective species, but they all have ascospores of a rather characteristic form, even though they are variable. They are all five septate by the sometimes irregular, septation of the two central cells of the immature 3-septate spore. The end cells always remain without vertical septa, whereas the 4 central cells usually have such septa at maturity. This complex fits very well Niessl's description and figures (6, p. 187, Pl. 4, fig. 11) of this species.

P. infectoria and *P. socialis* have this same type of spore but are here kept separate upon the basis of certain characters which may be the result of their habitat.

Collections of this type from the mountains of western America differ in certain minor details but grade off into the European species. A new variety is erected for this group of species.

var. **vulgaris** Figs. 5–7, 9, 10

Pyrenophora sedi Roum. & Brun. Rev. Myc. 1885: 174.
Pleospora sedi (Roum. & Brun.). Berl. & Vogel. in Sacc. Syll. Fun., Add. 170. 1886.
Pleospora minuta Kirschst., non Roum. Verh. bot. Ver. Brandenburg **48:** 56. 1906.
Pleospora microsomatica Kirschst., inedit., in Herb.
Pleospora araucana Speg., inedit., in Herb.

Sporae lutei-brunneae, 14–21 (24) μ longae, 6–7.5 μ crassae; ceterum ut in specie.

Spores yellow-brown to dark yellow-brown, 14–21 (24) $\times$ 6–7.5 (8.5) μ; otherwise as in the species.

Collections: *51, 54, 56, 57, 58, 59, 64, 65, 66a, 171, 172, 349, 452,* on various hosts, throughout Europe and from North and South America.

This variety is characterized by the yellow-brown spores which run smaller in general than those of the variety *ferruginea.* The asci also tend to be distinctly narrower and the perithecia generally smaller and less tomentose than in var. *ferruginea.* It is probably much more widespread than the collections listed would indicate.

The type collection (*57*) of *P. sedi* has spores which are typical of *P. vulgaris* but the asci are nearly all four-spored. Some eight-spored asci were seen, however, and the original description gives the spores as biseriate, so more evidence is needed to indicate that there is a four-spored variety.

Kirschstein gives the spores of his *P. minuta* as five- to nine-septate, but the type collection (*59*) (which is labelled *P. microsomatica*) shows only five-septate spores, 17–21.5 $\times$ 7–7.5 μ (fig. 9) and is typical of *P. vulgaris.* Berlese (2, p. 9) gives this species as a synonym of *P. oblongata* Niessl, but the spores of the type collection are obviously not of that species.

Saccardo gives *P. spegazzinina* Sacc. as on *Catalpa syringifolia,* from Conegliano and collected by Spegazzini, and as having seven-septate spores, 38–40 $\times$ 20–27 μ, like those of *P. herbarum,* which would indicate a fungus near *P. armeriae* (Cda.) Ces. & deNot. Berlese (2, p. 23; Pl. 32, fig. 1) finds spores from Saccardo's collection to be seven-septate and 32–35 $\times$ 12–15 μ and figures typical *P. herbarum*

spores. A Spegazzini collection (*56*) in the La Plata Museum, from Conegliano, on *Bignonia Catalpae*, collected March, 1876, shows *Diploidia catalpae* Speg. (as indicated), several species of *Phoma* and a *Pleospora* having the spores (Fig. 6) of this variety of *P. vulgaris*. If this is a portion of the type collection of *P. spegazziniana*, it must be a mixture of fungi including two *Pleospora* species.

A collection, on *Mespilus germanica*, from Chile, in the La Plata Museum (*54*) labelled *Pleospora araucana* Speg. is typical of this variety, but is found on grayish necrotic spots of the leaves.

var. **ferruginea** var. nov. Figs. 8, 14

Pleospora misera Speg. Bol. Acad. Nac. Cien. Cordoba **11**: 256. 1887.

Sporae brunneae vel ferrugineae, plerumque fusce rufibrunneae, 17.5–26 (28) μ longae, 7–11 μ crassae; ceterum ut in specie.

Specimen typicum sub numero 62 infra in enumeratione locorum. In caulibus *Pentstemonis* in republica Wyomingensi.

Spores biseriate, dark yellow-brown to, mostly, red-brown, 17.5–26 (28) $\times$ 7–11 μ. Otherwise as in species.

Collections: *62* (Type of var.), *67*, *72*, *73*, *74*, *79*, *80*, *99*, *167*, on various hosts, from the mountains of western North America, and from Tierra del Fuego.

This variety is characterized by the generally dark red-brown pigmentation of its spores, broader asci and slightly larger and more tomentose perithecia. It is characteristic of the Rocky Mountain region, where it grades off imperceptibly into *P. richtophensis*.

The type collection (*80*) of *P. misera* Speg. is "miserable" material and the spores are collapsed and agglutinated. Although larger than those of the var. *vulgaris*, these spores (Fig. 14) appear to be yellow brown and might be better placed in the latter variety.

PLEOSPORA RICHTOPHENSIS E. & E. Proc. Acad. Nat. Sci. Phila. 1894: 335.

Figs. 11–13, 15, 19

Perithecia 150–500 μ in diameter, spheric or rather strongly flattened, smooth or more commonly with a dark radiate tomentum of stiff hyphae, immersed, then erumpent as a papillate ostiole, or later almost superficial; walls 20–50 μ thick, of dark walled parenchyma; rather widely scattered.

Asci clavate, with a thickened apical wall and a claw-like base, 75–120 (140) $\times$ 20–32 μ.

Spores biseriate, fusoid-ellipsoid to ellipsoid, yellow-brown or red-brown to dark red-brown, 5-septate, straight or, usually, inequilateral to slightly curved, mostly symmetric, occasionally more tapered below, central cells usually vertically septate, end cells without vertical septa, ends rather acutely tapered or bluntly rounded, constricted at the central septum and slightly so at the secondary septa, 26–44 $\times$ 9–17 μ.

This species represents the natural continuation of the range of *Pleospora vulgaris*, and differs only in the larger spores and asci and the somewhat larger perithecia which are commonly more tomentose than in that species. Those collections with no spores less than 26 μ in length are arbitrarily placed here. Two varieties are recognized.

var. **richtophensis** Figs. 11–13

Pleospora colla Clem. inedit., in Crypt. Form. Colo. No. 440.
Pyrenophora ciliata var. *ecoronis* Clem. inedit., in Crypt. Form. Colo. No. 446.
Pyrenophora oedospora Clem. inedit., in Crypt. Form. Colo. No. 451.

Sporae atre lutei-brunneae vel atro ferrugineae; ceterum ut in specie. Specimen typicum sub numero 547 infra in enumeratione locorum. In caulibus *Helianthi*, ex Monte "Richtophen," in republica Coloradensi.

Spores dark yellow-brown to red-brown; otherwise as in species.

Collections: See Table 1: on various hosts from Colorado and Wyoming. (Type: coll. No. *547*.)

var. **pallida** var. nov. Figs. 15, 19

Sporae pallide lutei-brunneae; ceterum ut in specie.

Specimen typicum sub numero 536 infra in enumeratione locorum. In caulibus *Astri* ex monte "Rainier," in republica Washingtonensi.

Spores light yellow-brown, otherwise as in species.

Collections: *534: 536* (type of var.); on *Ranunculus* and *Aster*, from Washington.

The variety *richtophensis* with the more strongly pigmented spores is a natural continuation of *P. vulgaris* var. *ferruginea* and all of these collections come from the Rocky Mountain region, usually from altitudes above 9000 ft. The collections of the variety *pallida*, with light yellow-brown spores, on the other hand, both come from the Pacific Coast ranges, and from a somewhat lower elevation, although a similar ecological situation.

Ellis' type collection (*547*) of this species is characteristic of the variety *richtophensis*, as are those of Clement's *Pleospora colla* (*258*) and *Pyrenophora oedospora* (*262*). The type of Clement's *Pyrenophora ciliata* var. *ecoronis* (*261*) has older and more irregular spores, but is the same species.

Two isotype packets of *P. megalotheca* (*257*) examined yielded three different species of *Pleospora*, the most abundant of which was *P. richtophensis*, but as the original description is of a species with 11–13 septa it must apply to one of the other species present.

The perithecia of *P. richtophensis* usually show more or less of a tomentum of stiff black hairs which are visible under a hand lens, but these are sometimes absent or broken off and not always seen. This character would place them among the tomentose or setose species placed by some in the genus *Pyrenophora* and to be discussed in a future paper. Because of their obvious relation to *P. vulgaris*, they are included here.

THE PLEOSPORA MEDIA — PLEOSPORA HERBARUM COMPLEX

The following species, *Pleospora media*, is derived from the *P. vulgaris* level by the vertical septation of the end cells of the spores. Here again varying percentages of the spores of different collections may show such septation. This insertion of a vertical septum is probably a matter of spatial relationships and certain changes in spore form are correlated with it. Such spores have more broadly rounded ends, and therefore, the end cells have a greater diameter. If the vertical wall is laid down parallel to the long axis of the spore, the

secondary transverse septum in this end cell is at right angles to it, in the normal position (Figs. 20, 30). Very often, however, the vertical wall is inserted at an acute angle to the axis of the spore and the secondary wall is formed also at an acute angle and only on one side of the first formed septum, resulting in a "y" shaped septum in the end cell (Figs. 16, 17). A normal transverse secondary septum in each end cell results, of course, in a seven-septate spore. With increase of size and number of septa, the spores tend to become straight but asymmetric with a longer narrower lower portion and more than one vertical septum commonly appears in face view in the central cells. The spores vary in color from yellow brown to dark red-brown. The collections in this group are also restricted to those with perithecia which are smooth or with soft, light colored tomentum and of the herbaceous stem type. As previously stated, the setose-tomentose collections will be considered separately, and those with perithecia which are of the woody habitat type are separated as distinct species.

A glance at Tables 2 and 3, which include these collections with smooth perithecia and five- to seven-septate spores with vertical walls in the end cells, will show that there is a continuous series of overlapping ranges of spore size of individual collections from 14–60 × 7–26 μ. This covers even more than the size range found in the *P. vulgaris-P. richtophensis* series, yet there is no natural break anywhere. If one considers spore color, form, septation, size of perithecia or any other character, much the same situation obtains. This "herbarum complex," therefore, has been arbitrarily split up into three species, upon the basis of spore size, and a general correlation of certain other characters, as follows:

Pleospora media: Spores all, or at least the great majority of them, less than 28 μ in length.

Pleospora herbarum: Always with some spores over 28 μ in length, but never, or very rarely, with any spores over 40 μ in length.

Pleospora armeriae: Always with some spores over 40 μ in length,

Such a separation is neither natural nor satisfactory but is used merely to break up this enormous species complex into more workable groups. There will still remain collections which overlap the range of variation assigned to two species, and these can be placed in either of the respective species.

PLEOSPORA MEDIA Niessl. Verhandl. nat. Ver. Brünn *14:* 188. 1876.

Figs. 16–18, 20–28

Perithecia variously scattered, 100–300 (400) μ in diameter, spheric or somewhat depressed, smooth or slightly tomentose with soft light colored hyphae, soon erumpent.

Asci clavate to cylindric-clavate, with a somewhat thickened apical wall and a claw-like base (55) 70–100 (120) × (10) 12–26 μ.

Spores biseriate, rarely uniseriate, narrow fusoid to broad ellipsoid yellow-brown to dark yellow-brown or red-brown, 5–7 septate, straight, inequilateral or curved, symmetric or asymmetric, often with one end longer, narrower, more tapered or more inequilateral, constricted at the central septum and sometimes at the secondary septa, one or several

vertical walls in the central cells and a vertical or "Y" shaped wall in the end cell or cells of many spores, 14–26 (28) × 6–12 (13) μ.

Collections: See Table 2; on many hosts, from many localities.

This is a large species complex consisting of numerous collections and arbitrarily limited to those species with 5–7 septate spores having vertical walls in the end cells and 14–21 μ in length. It grades off imperceptibly into the following species *P. herbarum*, which shows the same variation in spore form and is arbitrarily separated upon spore size. It includes the type collections of many species, but seems to fit best the *P. media* of Niessl of which he says "Die Längstheilung der Spore ist kräftiger entwickelt und geht oft durch beide Endzellen, was bei *P. vulgaris* fast nie der Fall ist." Niessl states his species has dark colored spores, but the conception is here broadened to include yellow-brown spores. Merely to break up this large group, three varieties are recognized on the basis of spore form. The same thing could be done on the basis of spore color or septation. In any case there will be many collections which must be placed arbitrarily.

var. **media** Figs. 21, 24–28

Pleospora abromeitiana Henn. Pilze aus d. Umanakdistrikt 9. 1897.
Pleospora maireana Lamb. & Fautr. Rev. Myc.: 142. 1897.
Pleospora compositarum Earle in Greene Plant. Baker. vol. 2, fasc. 1:22. 1901.
Pyrenophora castillejae Earl, Ibid., vol. fasc. 1: 22. 1901.
Pyrenophora clematitis Earle, Ibid., vol. fasc. 1: 23. 1901.
Pleospora senecionis Earle, non Fck., Ibid., vol. 2, fasc. 1: 22. 1901.
Pleospora praeandina Speg. An. Mus. Nac. Buenos Aires **19**: 392. 1909.
Pleospora phyllophila Rehm, inedit., in Herb.
Pyrenophora corynis Clem., inedit., in Cr. Form. Colo. No. 447.

Sporae variabiles, saepissime latae et inequilaterales vel asymmetricae, sursum late rotundatae, deorsum angustatae, 16–18 μ longae, 7.5–14 μ crassae; ceterum ut in specie.

Spores variable in form, rather broad, often inaequilateral or asymmetric, with one end rounded and the other bluntly tapered or inaequilateral, 16–28 × 7.5–14 μ, dark yellow-brown to dark red-brown; otherwise as in species.

Collections: See Table 2, on various hosts, from Scandinavia, France, European Alps, California, Wyoming, Colorado, Michigan and Argentina.

This variety includes those collections whose spores are so variable in shape as to exclude them from either of the following varieties. The spores are usually darker, red-brown in color, more commonly seven-septate than in var. *acuta* or *obtusa*, and grade off into *P. herbarum occidentalis*. The Wyoming collections of this variety have been previously discussed (12, P. 210) under the binomial *P. compositarum*. The type (No. *81*) of this species has the red-brown, inequilateral spores (Fig. 24) typical of this variety. The perithecia are slightly tomentose, as is also true of many of the other collections placed in this variety. Earle's type material of *Pyrenophora clematitis* (No. 101) and *Pyrenophora castillejae* (No. *88*) (Fig. 25) show such a slight hairy, rather stiff tomentum about the base of the perithecia but no more so than many other collections of this group. The use of such slight tomentose conditions as a basis for inclusion of species in *Pyrenophora* indicates the untenability of that genus and the close relationship of its

species to those of *Pleospora*. The spores of *Pyrenophora clematitis* are very similar to those of *Pleospora compositarum;* those of *Pyrenophora castillejae* are similar but slightly smaller.

Earle's type collection (No. *89*) of *Pleospora lepidiicola* contains several fungi. There are small immature perithecia of some unknown fungus, and larger perithecia 200–250 μ in diameter, which often show a few stiff setae about the ostiole. There seem to be two species of *Pleospora* with this same type of perithecium; one (No. 89) has seven-septate spores, 26–32 $\times$ 12 μ and is placed under *P. herbarum;* the other (No. 89a) has smaller, five- to seven-septate spores, 19–22 $\times$ 8–9 μ and belongs in this variety. In spite of the occasional setae, this species was described under *Pleospora*. Earle's description gives the spore measurements as 20–28 $\times$ 10–11 μ, which is intermediate between the two fungi mentioned. His statement that they are seven-septate with three or more vertical septa, however, indicates that he had the larger spores in mind, and the binomial is therefore placed in synonymy under *P. herbarum*.

Earle's type collection of *Pleospora senecionis* (No. *90*) has spores identical to those of *P. lepidiicola*, but the perithecia are smooth walled.

The type collection of *P. maireana* (No. *68*) (Fig. 27) has typical small, dark brown spores and perithecia with some stiff, dark brown tomentum and causing small discolored spots on the stem surface.

Spegazzini's type of *P. praeandina* (No. *105*) has dark red-brown spores which are rather large for this variety.

In the Rehm Herbarium, there are two collections (Nos. *77*, *78*) which are labelled *Pleospora phyllophila* Rehm, a binomial which was apparently never published. The earlier of these collections (No. *77*) was first labelled *P. discors*, a binomial used for forms of *P. herbarum* with small perithecia. On this same packet the spores are indicated and figured as five-septate and clathrate. The spores (Fig. 28) of this collection are mostly old, crushed and opaque. There may be a slight flattening of some spores, but they have vertical septa in both faces and

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EXPLANATION OF FIGURES

FIG. 24. Spores from a collection (81) of *P. compositarum* Earle (type). FIG. 25. Spores from a collection (88) of *Pyrenophora castillejae* Earle (type). FIG. 26. Spores from a collection (*83*) of *P. compositarum* Earle. FIG. 27. Spores from a collection (68) of *P. maireana* (type?). FIG. 28. Spores from a collection (*77*) of *P. phyllophila* Rehm inedit. (type). FIG. 29. Spores from a collection (217) of *P. herbarum* (Fr.) Rab. (type of Rab.). FIG. 30. Spores from a collection (*218*) of *P. evonymi* Fck. (isotype). FIG. 31. Spores from a collection (*174*) of *P. salicorniae* Jaap. FIG. 32. Spores from a collection (229) of *P. denotata* (Cke. & Ell.) Sacc. (type). FIG. 33. Spore from a collection (*178*) of *P. gymnocladi* Bagnis (type). FIG. 34. Spores from a collection (*224*) of *P. erythrinae* Ces. (isotype). FIG. 35. Spore from a collection (*187*) of *P. scopulicola* Speg. (type). FIG. 36. Spores from a collection (*169*) of *P. leguminum* Rab. (isotype). FIG. 37. Spores from a collection (*127*) of *Pyrenophora eriogoni* Earle (type). FIG. 38. Spores from a collection (*124*) of *Pleospora proustiae* Speg. (type). FIG. 39. Spores from a collection of (*131*) *P. herbarum* var. *occidentalis* Wehm. FIG. 40. Spores from the type collection of *Sphaeria armeriae* Corda (*545*). FIG. 41. Spores from a collection (*256*) of *P. maritima* Rehm (isotype). FIG. 42. Spores from a collection (*248*) of *P. maritima* Rehm. FIG. 43. Spores from a collection (*254*) of *P. gigaspora* Karst. FIG. 44. Spores from a collection (*479*) of *P. jaapiana* Rehm (isotype).


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are not truly clathrate. Both collections have small perithecia which are very soon erumpent superficial upon the leaves of *Androsace*, and broad, non-constricted very dark-red-brown spores which are always five-septate. If this combination of characters can be shown to be constant in more collections, it would comprise a separate species.

The type collections of *P. abromeitiana* (No. *85*) has very small globose perithecia, but they are on stems. The spores are again dark red-brown nearly all five-septate and have broadly rounded ends.

The *Pyrenophora corynis* of Clements (No. *116*) has perithecia which are tomentose about the base, and occasionally show a few broken setae. The spores are as described for this variety.

Spegazzini's collection (*428*) of *P. subantarctica* shows similar small spores with obtuse ends, but they are asymmetric in form and intermingled with them are fusoid spores with tapered ends.

var. **acuta** var. nov. Figs. 16, 17

Pleospora spinosella Rehm, in Asc. exs. No. **440**.

Sporae subangustae, 14–26 μ longae, 7–10 μ crassae, fusiformes, utrinque obtuse angustatae, saepe inaequilaterales vel curvatae, pluries 5-septatae, pluries lutei-brunneae, interdum atro-brunneae; ceterum ut in specie.

Specimen typicum numero 71 infra in enumeratione locorum, In caulibus *Junci*, in Tyrolensibus montibus.

Spores rather narrow, 14–26 × 7–10 μ, fusoid, with bluntly tapered ends, mostly five-septate, often inequilateral or curved, mostly yellow-brown, or at most dark yellow-brown. Otherwise as in species.

Collections: See Table 2. From Scandinavia, the Alps and Argentina. (Type 71)

This variety is erected for those collections which have a spore form similar to that of *P. vulgaris*, differing only in the vertically septate end cells. Some collections (i.e. Nos. *442*, *321*, *322*) are obviously of this sort, whereas others (No. 107) show occasional seven-septate spores, with more rounded ends, or straighter spores with a darker brown color.

The type collection of *P. spinosella* (No. *71*) has fusoid rather straight, rather dark brown spores (Fig. 16) and large perithecia. A second collection of this species (No. *75*) shows such spores intermingled with others of the type of var. *obtusa*, with broadly rounded ends.

var. **obtusa** var. nov. Figs. 18, 20, 22, 23

Pleospora herniariae Fck. Symb. Myc. 131. 1870.
Pleospora syringae Fck. Sumb. Myc. 133. 1870.
Pleospora varians Ces. Hedw. **21**: 9. 1882.
Pleospora chuquiragae Speg. An. Mus. Nac. Buenos Aires **19**: 390. 1909.
Pleospora herbarum f. *solidaginis* Frag. Trab. Mus. Nac. Cien. Nat., ser. Bot. **4**: 22. 1914.
Pleospora inulae-candidae Jaap. Ann Myc. **14**: 16. 1916.
Pyrenophora subantarctica Speg., inedit., in Herb.
Scleroplea aurantiorum Rehm. Pomona Coll. Journ. Econ. Bot. 1911: 106.

Sporae breves, latiores quam in varietate praecedenti, 14–29 μ longae, 9–14 μ crassae, plerumque rectae vel paulo inaequilaterales, interdum asymmetricae, late rotundatae, plerumque lutei-brunneae; ceterum ut in specie.

Specimen typicum sub numero 177 infra in enumeratione locorum. In caulibus *Herniariae*, in loco dicto "Judensand, Oestrich," Germania.

Spores broader in relation to their length than in var. *acuta*, 14–29 × (6) 9–14 μ, mostly straight, sometimes curved or inaequilateral, sometimes asymmetric, mostly symmetric, ends mostly broadly rounded, usually yellow-brown in color. Otherwise as in species.

Collections: See Table 2, from Central Europe, Greenland, California, Colorado, Argentina and Tierra del Fuego. (Type of var.: No. *177*).

This variety is erected for a group of collections with broad spores having broadly rounded ends, which are for the most part straight and yellow-brown. In so defining it, the variety includes a number of collections, under various binomials, which occur on leaves. There has been a tendency among some workers to give new binomials to collections or groups of collections because they occur on leaves and have certain correlated characters such as small perithecia, less than 200 μ in diameter. There is no doubt that leaf inhabiting individuals often show such smaller perithecia, and often with prominent ostiolar necks. The spores found in such collections overlap the variety, *media* and the species *P. herbarum*, because of their range in size, color and form. When examined as a group, it soon becomes apparent that the habitat and the size of the perithecium is not necessarily correlated with other characters as spore size, septation, form or color.

Collections *76*, of *P. inulae-candidae* and *100*, of *P. chuquiragae* have such small perithecia on leaves and rather dark yellow-brown five- or rarely seven-septate spores which have blunt rounded ends, but the spores are curved (Fig. 20) or inaequilateral and approach the form of the variety *acuta*.

Jaap described *P. inulae-candidae* as similar to *P. media* except for the more brown color of the spores and erumpent perithecia. The perithecia are small, globose, with prominent ostiolar necks and are actually superficial upon the leaf tissue, but imbedded in the dense tomentose hairs of the leaf. *P. phyllophila* is another species similar to these, but it has straighter spores with more pointed ends and is treated under the variety *media*.

Collections Nos. *177* of *P. herniariae*, *184* of *P. syringae* and *452* of *Scleroplea aurantiorum*, all of which are type material, and all of which show similar leaf inhabiting perithecia with large, light yellow-brown spores of the *P. herbarum* type and overlap the range of that species.

The spores of *P. herniariae*, as seen by the writer (Fig. 22) and figured by Berlese (2, Pl. 29, fig. 2) are more fusoid than those of *P. syringae* (Fig. 23). Berlese gives the spores of *P. herniariae* as 28–32 × 10–12 μ, but the writer found them to be 22–26.5 × 9–12 μ, whereas those of *P. syringae* ran to 28 μ or just within the arbitrary limits of this species, *P. media*.

In 1911, Tehm published *Pleospora* (*Scleroplea*) *aurantiorum*. In 1912 (10, p. 357), he gave this as a synonym of *P. media* var. *limonum* Sacc., which he issued in his Asc. No. 1996 from this same collection of *Scleroplea aurantiorum*. A copy of this exsiccatus (*452*) examined, yielded a *Pleospora* with spores 18–25 × 7–8.5 μ and of the *P. vulgaris* type without vertical septa in the end cells. A second copy of this same

exsiccatus showed only a *Stemphylium* and a *Diplodina* upon examination. Rehm states that a *Septoria* also occurs on these leaves. In the Riksmuseum there is a packet and a slide (*453*) labelled as *Scleroplea aurantiorium*. There is only a *Mycosphaerella* upon the leaves in the packet, but the slide shows spores of a *Pleospora*. They are five- to seven-septate, 26–29 × 12.4–14 μ and are of the *P. herbarum* type with occasional vertical septa in the end cells. Rehm's description (Ann. Myc. *10:* 357) of the spores of *P. media* var. *limonum* as five- rarely seven-septate, 30 × 12–14 μ, and with vertical walls in all but the end cells, and of the spores of *Scleroplea aurantiorum* as five celled, 22–24 × 10–14 μ and with two vertical walls in all but the end cells, suggests that he included both of these *Pleosporas* as one species. Inasmuch as the slide of *Scleroplea aurantiorum* has spores like those of *P. media* var. *obtusa* the binomial is placed under this variety as a synonym even though the spores occasionally are slightly longer (29 μ) than allowed for this variety and might be considered *P. herbarum*.

Pleospora evonymi, again, is a leaf inhabiting species identical to the preceeding three in every way except the larger spores (Fig. 30) which are 27–35 μ long and, therefore, place this species under *P. herbarum* according to our present interpretation. *P. varians* (*84*) has type material of this leaf type, but the spores are darker brown and often tapered, in which respects it approaches the variety, *media*.

It should also be noted that some collections on leaves have larger perithecia running to 250 or 300 μ (i.e. Nos. *84*, *453*, *193* and others). It is also true that small perithecia may occur on stems and associated with the above spore characters described for leaf forms (i.e. Nos. *85*, *94*, *101*, *343* etc.). These characters of leaf habitat and perithecial size have not, therefore been used for species separation.

Collection No. *170*, of *P. oblonga* Niessl has extremely small spores (Fig. 18) of an oblong-ellipsoid form and with a single vertical septum running continuously through all the cells.

Fragoso describes his *P. herbarum* f. *solidaginis* (*500*) as having spores 28–35 × 12–15 μ, but an examination of the type collection showed many of them in a collapsed condition but the normal spores appeared to be yellow-brown to dark yellow-brown, with bluntly rounded ends and 21–26.5 × 12–15 μ, which would place the collection in this variety, *obtusa*.

PLEOSPORA HERBARUM Rabenhorst. Herb. mycol. Ed. II, Nos. 547a-e. 1857.

Figs. 29–39

Perithecia variable, 100–500 μ in diameter, sparsely or thickly scattered, mostly somewhat flattened-spheric, often collapsing pezizoid, commonly strongly stromatic with wall much thickened, especially at the sides, 20–80 μ thick, parenchymatic, at other times thinner more membranous, ostiole papillate to short conic, usually smooth, sometimes slightly tomentose.

Asci stout clavate, elongating at maturity, thick-walled, particularly at the apex, base claw-like, (75) 90–150 (200) μ 18–32 μ.

Spores biseriate in the ascus, fusoid-ellipsoid to oblong-ellipsoid, 5- to usually 7-septate, yellow-brown, dark yellow-brown or red-brown,

usually with vertical walls in the end cells, constricted somewhat at the central septum and often at the secondary septa, usually straight but sometimes inequilateral, symmetric or commonly, in the larger spores, asymmetric with the upper portion broader, shorter and rounded (sometimes taper pointed) and the lower portion narrower, longer and more tapered, ends mostly broadly rounded but occasionally bluntly tapered, 20–40 × 8–14 (16) μ but always with some spores more than 28 μ long.

Collections: See Table 3, on many hosts, world wide. (Type: coll. No. 217).

Pleospora herbarum is of particular interest because it is the type species of the genus. In 1857, Rabenhorst issued the series (547a-e) of exsiccati cited above and on the label of No. 547a stated "Sphaeriaceum nov. genus. Sphaeriae sp (*herbarum*) autt." The *Sphaeria herbarum* of previous authors is a mixed species, based on macroscopic characters, with no attention payed to the spores or other microscopic characters. In fact Ravenhorst's own preceding exsiccati (Herb. Myc.) Ed. II, Nos. 544–546) of *Sphaeria herbarum* include a *Leptosphaeria* and two pycnidial forms.

Fries issued a *Sphaeria herbarum* in his Scler. Suec. No. 38. In response to an inquiry, Dr. Nannfeldt (in litt.) has kindly supplied the following statement "As to *Sphaeria herbarum* I can only tell you that we have no Fries specimen." In his Scleromycetes Sueciae, a *Sphaeria herbarum* var. *gamma* was distributed but our copy contains only some minute "Phoma." Through the kindness of Dr. Lam of the Leiden Rijksherbarium, the writer was able to examine the *Sphaeria herbarum* beta tecta of Persoon, which is referred to by Fries (4, p. 511). This consists of excellent material of some *Ophiobolus*. In view of the confusion existing in the older conceptions of *P. herbarum* as expressed by various collections and because of the excellence and wide distribution of Rabenhorst's exsiccati, the writer feels that Herb. Myc. 547a should be conserved as the lectotype of *Pleospora herbarum* and in turn of the genus *Pleospora*. As a matter of fact, this policy has been followed by nearly all writers since the time of Rabenhorst's erection of the genus.

Rabenhorst's No. 547a is on *Allium* and shows the comparatively thin-walled, thickly scattered type of perithecium which is strongly depressed and finally collapses in a pezizaeform fashion. This form on *Allium*, as can be seen from Table 3, seems to have rather elongate asci and long, asymmetric, oblong-ellipsoid spores (Fig. 29). *P. herbarum* has been variously interpreted by subsequent authors and over forty varieties of this species have been published, based largely upon host differences. In many exsiccati and collections such host differences are used as a routine excuse for the erection of new varieties or forms. Numerous species have also been described within the limits here allowed for *P. herbarum*. The synonymy, as given, is limited to those species of which type material has been examined, and remarks upon these will be reserved for the end of this discussion.

There is a good deal of variation within the species as here circumscribed and there are certain tendencies which can be followed from *P. media*, through this species and into *P. armeriae*. Some of these variations might, and in fact have been, used for specific differentiation.

The name *P. discors* (Mont.) Ces. & de Not., for instance, has been used for collections of this group with small perithecia, and there are many collections in which this is a character distinguishing them from other collections having the large, thick-walled, stromatic perithecia usually ascribed to *P. herbarum*. The type collection, again, has large thin-walled collapsing perithecia. On the other hand the size of the perithecium and its wall thickness will show the same overlapping variation as the size of the spore, as a glance at Table 3 will indicate. Furthermore, small perithecia may be found on leaves or stems, may be smooth, tomentose or setose and may contain spores which are small or large (even into the *P. armeriae* group), yellow-brown or red-brown, and of many different forms. Once one begins using specific, varietal or form names for all of these combinations of characters, the confusion becomes greater than any supposed order obtained.

The species is here divided into two varieties on the basis of color and certain minor correlated changes in spore form, but there are intermediate conditions here also.

var. **herbarum** Figs. 29–36

? *Sphaeria leguminum* Wallr. Fl. Cr. **2**: 772. 1833.
? *Sphaeria herbarum* Pers. Syn. Fung. 79. 1801.
? *Sphaeria herbarum* Fr. Syst. Myc. **2**: 511. 1823.
Sphaeria allii Rab. in Herb. mycol. Ed. 1: 838.
Pleospora leguminum (Wallr.) Rab. in Herb. mycol. II: 548. 1854.
Pleospora allii (Rab.) Ces. & deNot. Comm. Soc. critt. ital. **1**: 218. 1861.
Pleospora salsalae Fck. Symb. Myc. 131. 1869.
Pleospora evonymi Fck. Symb. Myc. 133. 1869.
Sphaeria denotata Cke. & Ell. Grev. **6**: 16. 1877.
Sphaeria australis Cke. Grev. **8**: 67. 1879.
Pleospora erythrinae Ces. in Rab. Fung. Eur. 2658.
Pleospora verbasci Rab. in Marc. Un. fl. #2 and Barbey Fl. sard. Comp. 204.
Pleospora gymnocladi Bagnis Micol. Rom. Cent. **1**: 17.
Pleospora labiatarum Cke. & Harkn. Grev. **9**: 8. 1880.
Pleospora principis Pass. Micr. ital No. 6. 1880.
Pleospora meliloti Rab., in Fung. Eur. 2330. Sacc. Syll. Fund. **2**: 247. 1883.
Pleospora denotata (Cke. & Ell.) Sacc. Syll. Fung. **2**(2): 251. 1883.
Pleospora clarkeana Ell. & Ev. Bull. Torr. Bot. Cl. **11**: 75. 1884.
Pleospora pezizoides Ces. Hedw. **24**: 262. 1885.
Pleospora freticola Speg. Fung. Pat. (Bol. Acad. Nac. d. Cien. d. Cordoba **11**: 50.) 1887.
Pleospora insularis Speg. Fung. fueg. (Bol. Acad. Nac. d. Cien. d. Cordoba **11**: 258.) 1887.
Pleospora scopulicola Speg. Fung. fueg. (Ibid. **11**: 259). 1887.
Pleospora triglochinis Har. & Bri. Rev. Myc. 1890: 131.
Pleospora piptochaeti Speg. Fung. arg. nov. (Anal. d. Mus. Nac. Buenos Aires 1899: 283.)
Pleospora proteispora Speg. Fung. arg. nov. Ibid. 1899: 284.
Pleospora acantholimonis Henn. Notizblatt kgl. bot. Gart. Berlin 1900: 37.
Pleospora herbarum var. *subsulcata* (E. & E.) Sacc. & Trott. Syll. Fung. **20**: 439. 1911.
Pleospora acaciicola Henn. Verh. bot. Ver. Prov. Brandenb. **40**: 158. 1898.
Pleospora salicorniae Jaap. Verh. bot. Ver. Prov. Brandenb. **49**: 16. 1907.
Pleospora herbarum var. *salicorniae* Jaap. Ann. Myc. **14**: 17. 1916.
Pleospora culmicola Speg. Fung. Chil. 89. 1910.
Pleospora puyae Speg. Fung. Chil. 85. 1910.
Pleospora alstroemeriae Speg. Fung. Chil. 90. 1910.
Pleospora nigritula Rehm, inedit. in Herb.
Pleospora armeriae subsp. *freticola* (Speg.) Berl. Lc. Fung. **2**: 24. 1900.
Pleospora lepidiicola Earle in Greene, Plant. Baker. **2**(1): 32. 1901.
Pleospora vulgatissima Speg. Anal. Soc. Cien. Arg. **13**: 180. 1882.
Pleospora australis (Cke.) Sacc. Syll. Fung. **2**: 253. 1883.

Sporae lutei-brunneae vel atri-brunneae, rectae, symmetricae vel asymmetricae; ceterum ut in specie. Specimen typicum sub numero 217 infra in enumeratione locorum. In caulibus *Allii*.

Spores yellow-brown to dark yellow-brown, straight, symmetric or asymmetric; otherwise as in the species.

Collections: See Table 3, on various hosts, world wide.

The spores in this variety usually have broadly rounded ends. The upper end may be tapered in somewhat abnormal spores, but rarely inequilateral. They may be short and symmetric as in many leaf inhabiting collections, or longer and asymmetric, with a tapered lower portion.

The following comments may be made upon the rather extensive synonymy of this variety; spore measurements can be found in Table 3.

The spores of *Sphaeria allii* Rab. (*241*) are typical, rather large spores of this species on *Allium* as in Herb. myc. 547a (Fig. 29) in which exsiccatus this binomial is given as a synonym.

Rab. Herb. Myc. 548, of *P. leguminum* Rab. (*169*) has somewhat abnormal and variable spores (Fig. 36) with irregular septation and sometimes with only three or five septa. The perithecia are typical of the large stromatic *P. herbarum* perithecia and *P. leguminum* is no doubt an aberrant *P. herbarum* as usually considered.

The type collection (*223*) of *P. salsolae* Fck. has rather large but typical spores of the *P. herbarum* type, but small perithecia which occur on small stems and leaves. The type (*218*) of *P. evonymi* Fck. has almost identical spores (Fig. 30) and also occurs on leaves but the perithecia have thick stromatic walls. *P. syringae* Fck., as mentioned, is very similar to these two species but the spores are somwehat smaller and it is placed in *P. media* var. *obtusa*.

The type (*229*) and several other collections (*216*, *226*, *231*) of *Sphaeria* (*Pleospora*) *denotata* Cke. & Ell. all show rather large perithecia which are often strongly flattened, have rather prominent conic ostioles and thick (30–100 μ) stromatic walls. The spores (Fig. 32) are typical of the large herbarum spores, with a rather dark brown coloration.

Type material of *Sphaeria australis* Cke (*200*) shows rather large globose perithecia with prominent conic ostioles and the larger type of herbarum spore, again.

The type material (*224*) of *Pleospora erythrinae* Ces., which was examined, showed mostly old decayed perithecia, again on leaves, but a few, on the midrib of the leaf, were strongly stromatic and contained the large spores (Fig. 34) typical of *P. herbarum*.

Type material of *P. verbasci* Rab. (No. *220*) shows typical *P. herbarum* spores with broadly rounded ends.

Pleospora gymnocladi Bagnis (No. *178*) has strongly flattened perithecia, with thick stromatic walls, on petioles, and rather variable spores (Fig. 33) which are often bluntly tapered above, but typical of this species.

There are two packets of type material of *Sphaeria labiatarum* Cke., in the California Academy of Science Herbarium, numbered 1087 and 7285 but both marked Harkness No. 1488. The first (1087) showed only several species of *Phoma*. The second packet yielded several perithecia containing typical *P. herbarum* spores but large and at the upper portion of the range of this species. This specimen yielded

a third fungus with muriform brown conidia 10.5–12.5 × 6–7 μ, having three transverse and one vertical septum, and belonging in *Camarosporium*. Cooke in his description says the species is a small *P. herbarum* but gives the spores as 3-septate and 25 × 10 μ. Whether he saw immature spores of the *Pleospora* or mistook spores of the *Camarasporium* for ascospores is difficult to say.

The type collection of *Pleospora principis* Pass. (No. *213*) has flattened rather thick-walled perithecia on palm fronds. The spores are often faintly, or irregularly septate sometimes appearing 3- or 5-septate, but this is probably due to the immaturity of the material. Fully mature spores are typical of *P. herbarum*.

Pleospora meliloti Rab., as issued in Fung. Eur. 2330, is a typical *P. herbarum* with large, thick-walled, stromatic perithecia.

There is abundant material of the original collection of *Pleospora clarkeana* E. & E. (*No. 481*) but no perithecia or spores could be found. An accompanying note by Miss Clarke says "I gathered it in June (1884) and saw black marks on the leaves which I fancied might be a fungus. Very likely it is too young to show anything." Ellis has drawn an ascus and two spores giving their measurements as 125 × 25 μ and 35–40 × 13–17 μ respectively. A single 7-septate spore, 29 × 12.5 μ was seen in leaf debris. A second collection (*234*) made by Miss Clarke at the same station in 1885, however, shows rather small perithecia on the peduncles. The spores are rather large and approach the upper range of *P. herbarum*, suggesting *P. maritima* as found on maritime plants.

The type material (No. *222*) of *Pleospora pezizoides* Ces which was examined contained mostly old decayed perithecia, but one perithecium with spores was found. These spores were variable, often five or six septate and tapered below, but of the *P. herbarum* type. Berlese (2, p. 28) also gives this collection as sterile. The depressed top of the perithecia referred to in the description is probably the decayed and collapsed upper wall.

The type collection (No. *195*) of *Pleospora freticola* Speg. has spores with rounded ends and in the median size range of *P. herbarum* but rather dark brown in color. A second collection, on *Culcidium*, (No. *240*) shows similar but larger spores also dark in color. Many of the *Pleospora* collections of extreme southern latitudes (i.e. Tierra del Fuego) show this dark coloration. It is difficult to understand what basis was used by Spegazzini for the establishment of species, when two collections on different hosts with widely different spore measurements are placed in a new species which overlaps a half dozen other new species from the same region. Berlese (2, p. 24) places this species as a subspecies of *P. armeriae*, which has even larger spores. (See discussion under that species).

The type collection (No. *206*) of *Pleospora insularis* Speg. has rather small perithecia upon leaves. The spores are pale yellow-brown, narrow and irregularly septate, often with only three or five transverse and incomplete vertical septa, in which respect it resembles the type of *P. leguminum* Rab.

The type of *Pleospora scopulicola* Speg. (No. *187*) has medium sized but thick-walled, stromatic perithecia and spores (Fig. 35) which

are typical of *P. herbarum* but rather dark brown as in several of these antarctic collections.

The type collection (No. *219*) of *Pleospora triglochonis* Har. & Briard has flattened, thick-walled perithecia and characteristic *P. herbarum* spores, some of which are quite small but most of which are within the range of this species.

The type (No. *199*) of *Pleospora piptochaeti* Speg. has rather stromatic perithecia on leaves and a fragment of stem. The spores are rather long, but narrow, tapered below, dark yellow-brown and tardily septate, in which characters they resemble the spores of *P. insularis* and *P. leguminum*.

The two co-type collections of *Pleospora acantholimonis* Henn. (No. *211*, *211a*) have medium size, globose, rather thick-walled perithecia on leaves. The spores are typical of *P. herbarum* and cover most of the size range of that species.

The type collection (No. *192*) of *Pleospora proteispora* Speg., has medium sized perithecia with thick stromatic, walls, prominent ostioles and typical spores, but with very little constriction at the septa.

The type of *Pleospora subsulcata* E. & E. (No. *225*) has perithecia with slightly thickened (20–40 μ) walls and typical herbarum spores which are rather tapered and often five septate, probably because of immaturity.

The type collection (*193*) of *Pleospora acaciicola* Henn. has rather small, thin-walled (15–45 μ) perithecia thickly scattered on grayish areas of the leaves, and typical herbarum spores, with some small ones in the lower size range.

The type collection of *Pleospora salicorniae* Jaap (No. *175*) and other collections (*174*, *176*, *221*, *202*, *223*) show globose or slightly flattened perithecia, with slightly thickened (15–40 μ) walls and prominent ostioles, which become strongly erumpent and superficial at maturity. The spores (Fig. 31) of these collections show a wide range in size and there are often small spores within the range of *P. media* predominating, but there are always some much larger spores admixed with them. Jaap noted this variability in *P. salicorniae* and later (5, p. 17) made it a variety of *P. herbarum*.

The type collection (*237*) of *Pleospora culmicola* Speg. shows large globose perithecia with thickened (20–60 μ) walls and large spores of the herbarum type, but with little or no constriction at the septa.

Spegazzini describes his *Pleospora puyae* as having variable spores with one, three or five septa, 18–20 $\times$ 8–9 μ, which usually lack vertical septa in the end cells. His figures, furthermore, resemble the spores of *Pleospora vulgaris*. Examination of the type collection (No. *230*), however, yielded only larger spores which were five or finally seven septate and typical of *P. herbarum*. Either this material originally had two species present upon it, or Spegazzini saw only immature spores of a *P. herbarum*.

The type collection (*190*) of *Pleospora alstromeriae* Speg. bears scattered, somewhat flattened perithecia with herbarum type spores which are rather narrow and often with abruptly tapered ends. Many of the spores are five septate.

The collection (*113*) in the Rehm Herbarium, labelled *Pleospora*

nigritula n. sp., has small somewhat tomentose perithecia upon leaves. The spores are dark yellow-brown to red-brown and are mostly small (23–26.5 × 9–11 μ) and of the *P. media* type but some of the spores are up to 32 μ in length and necessitate its placement in *P. herbarum* according to our present separation.

As mentioned under *P. media* var. *media*, the type (*89*) of *P. lepidiicola* Earle is a mixture of *P. herbarum* and that species. Since the description of the spores suggests *P. herbarum* the binomial is placed here in synonymy. The spores are rather dark brown and approach the var. *occidentalis*.

Of the two co-type packets of *P. vulgatissima* Speg., (labelled *P. sclerotiodes* var. *vulgatissima*) the earlier collection (*546*) is immature and yielded no spores, but drawings on the packet seem to indicate *P. herbarum*. The second collection (*198*) yielded typical *P. herbarum*.

var. OCCIDENTALIS Wehm. Lloydia *9:* 218. 1946. Figs. 37–39

Pleospora collatina Sacc. & Speg. Mich. **1:** 347. 1878.
Pyrenophora erigoni Earle, in Greene, Plant. Baker. **2:** 24. 1901.
Pleospora proustiae Speg. An. Mus. Nac. Buenos Aires **11:** 392. 1909.
Pleospora herbarum f. *nepetae* Frag. Trab. Mus. Cienc. Nat. Hist., ser. bot. **4:** 22. 1914.
Pleospora kouh-cherrica Frag. Bol. R. Soc. Espan. Hist. Nat. 1918, 80.

Spores dark brown to red-brown, often somewhat inequilateral or sometimes with one end more or less bluntly tapered and the other abruptly rounded; otherwise as in species.

Collections: See Table 3, on various hosts, from Iran, Italy, Spain, Argentina, Colorado & Wyoming. (Type: Coll. No. *118*).

This variety with darkly pigmented spores is characteristic of higher altitudes. It is a continuation of the series found under *P. media* var. *media*, and continues in turn to form the group under *P. balsamorrhizae*.

The type of *Pyrenophora eriogonii* Earle (*127*) (Fig. 37) is characteristic of this variety. There are a few short broken stiff hairs, but they are very scattered, on these perithecia.

The type (*124*) of *P. proustiae* Speg., consists of old and decayed perithecia which are scattered on decorticated wood and almost entirely superficial, but the spores (Fig. 38) are like those placed in this variety.

Fragoso's type of *P. herbarum* var. *nepetae* (*493*) also has the large, inequilateral dark brown spores of this variety.

Some collections of this variety show the tendency toward the formation of small perithecia which are slightly tomentose, or even setose (*127*, *132*) which leads to the species *P. balsamorrhizae*. The type (*499*) of *P. kouh-cherrica*, for instance has small perithecia, saccate asci and is very similar to that species. It is placed here arbitrarily because of the spore size.

In the LaPlata Museum, there is a collection (*420*) labelled *Pleospora collatina* Sacc. & Speg. which is from Sacc. Myc. Ven. 922, with the host name *Melilotus* crossed out and *Capparis* written in. It seems that this may be a part of the type collection. It is poor material containing mostly old collapsed *pycnidia* of a *Camarasporium* and a few *Pleospora* perithecia 150–250 μ in diameter which contain agglutinate

spores of the dark red brown color and form of this variety. They measure 34–40 × 12.5–14 μ. Berlese (2, p. 26) gives the spores of this species as 38–42 × 14–16 μ and his figures (2, Pl. 38, fig. 1) show red brown spores with usually nine septa. It is possible that this is true, for the Spegazzini material is very poor. If so this species would fall in the group previously treated by the writer (12) as *P. njegusensis*.

The name of this variety will have to be changed, but further search will be necessary to find the oldest epithet applicable to this group, so the name *occidentalis* is retained for the present.

PLEOSPORA ARMERIAE (Cda.) Ces. & deNot. Schem. Sfer. (Comm. Soc. critt. ital. *1:* 218). 1861.

Figs. 40–46

Aphaeria armeriae Corda Ic. Fung. **4:** 41, Pl. 8, fig. 119. 1840.
Sphaeria armeriae Rab. Deut. Krypt. Fl. 175. 1845.
Pyrenophora armeriae (Cda.) Berl. Nouv. Giorn. bot. ital. **20:** 242. 1888.
Pleospora maritima Rehm, Hedw. **35:** (149). 1896.
Pleospora jaapiana Rehm, Verh. bot. Ver. Prov. Brandenburg **49:** 16. 1907.
Pyrenophora freticola Speg. inedit., in Herb.

Perithecia thickly or widely scattered, usually on small stems or leaves, 200–400 μ in diameter, globose or sometimes flattened or even collapsed, mostly smooth, sometimes slightly tomentose, ostiole papillate to short conic, walls 20–70 μ thick, parenchymatic, stromatic in some collections.

Asci mostly broad clavate, sometimes saccate, wall thickened, especially at the apex, base claw-like, 110–200 (300 when fully elongated for spore dispersal) × 26–50 μ.

Spores biseriate, ellipsoid to oblong-ellipsoid, yellow-brown to dark yellow-brown, 7-septate, mostly straight, occasionally inequilateral, symmetric or somewhat tapered below, scarcely constricted at the septa or more definitely so, with 1–3 vertical septa visible in face view, ends rounded, (23) 35–50 × (11) 16–21 μ.

Collections: See Table 3, on various hosts, from central Europe, Scandinavia and Argentina (Type: Coll. No. *545*).

This species is based upon a group of collections in which the spores become larger than is common in *P. herbarum*, but retain the form and seven septa of that species. As has been mentioned, there are certain collections of *P. herbarum* in which the spores vary over a wide range, in length. This is often true on certain maritime halophytic hosts such as *Salicornia*, *Salsola* and *Acantholimon*. A continuation of this same tendency, resulting in collections having some small spores within the range of *P. herbarum*, but always some larger spores, over 40 μ in length and 14 μ in diameter, occurs on a similar ecologic group of host plants (i.e. *Triglochin*, *Plantago maritima*, *Armeria* etc.), in this species. This results in an overlapping of the two species.

Collection *125a*, of *Pyrenophora tragacanthae*, for instance, has many spores in the range of *P. herbarum*, but a few which are 40 × 19 μ, and it is placed in *P. armeriae* arbitrarily. This collection is also on *Astragalus*, from rather high altitudes in the Rocky Mt. region and has rather dark colored spores, all of which suggest a relationship with *P. balsamorrhizae*.

There are certain vague correlations between spore form and host, in this species, also. The type (*256*) and No. *248* of *P. maritima*, on *Triglochin*, have asymmetric spores (figs. 41, 42) with tapered ends, as commonly found in *P. herbarum*. The type collection (*479*) of *P. jaapiana* and No. *254*, of *P. gigaspora*, both on *Plantago*, have spores (figs. 43, 44) which are comparatively long and narrow, cylindric and with abruptly rounded ends. Collections Nos. *251* and *351*, of *P. armeriae*, on *Armeria*, have spores (Figs. 45, 46) which are broadest in the middle and taper gradually toward both ends, which are broadly rounded and the constrictions are very shallow. These are not constant, however.

The above difficulties are reflected in choosing the proper specific epithet for this group. *Sphaeria armeriae* was first described by Corda in 1840. His figures show setose perithecia and five-septate spores with a broad ovoid form as mentioned above for specimens on *Armeria* and their size is given as .0015 "Paris inch" (40.5 μ in length). Saccardo (11, P. 247) placed Corda's species as a form of *P. herbarum* and Winter (15, p. 504) place it as a synonym of the same species. In 1844 (9, p. 175), Rabenhorst again described *Sphaeria armeriae*, with perithecia ". . . an der Spitze mit zerstreuten Haaren, spater kahl . . .," but cited Corda's description, figures and collection for this species. Berlese (1, p. 242; 2, p. 44) transferred Corda's *Spheria* to *Pyrenophora armeriae* (Cda) Berl., because of the hairs of setae about the ostiole, but referred *Sphaeria armeriae* Rab. to *Pleospora armeriae* (Rab.) Ces. & deNot. (1, p. 125; 2, p. 24). In doing so he committed several errors. In the first place, both Cesati and de Notaris, and Rabenhorst definitely referred their binomials to Corda's *Sphaeria armeriae*, who is, therefore, the original authority for both binomials which become synonymous. Secondly, in his description of *Pleospora armeriae* (Rab.) Ces. & deNot., he cites his source collection as "Es specim. origin, in Rab. Fung. Eur. n. 1635 . . .," which cannot be true for this collection was not originally cited by Rabenhorst and was issued long after (1873) the publication of the *Sphaeria armeriae* referred to. Rabenhorst also mentions the "zerstreuten Haare" about

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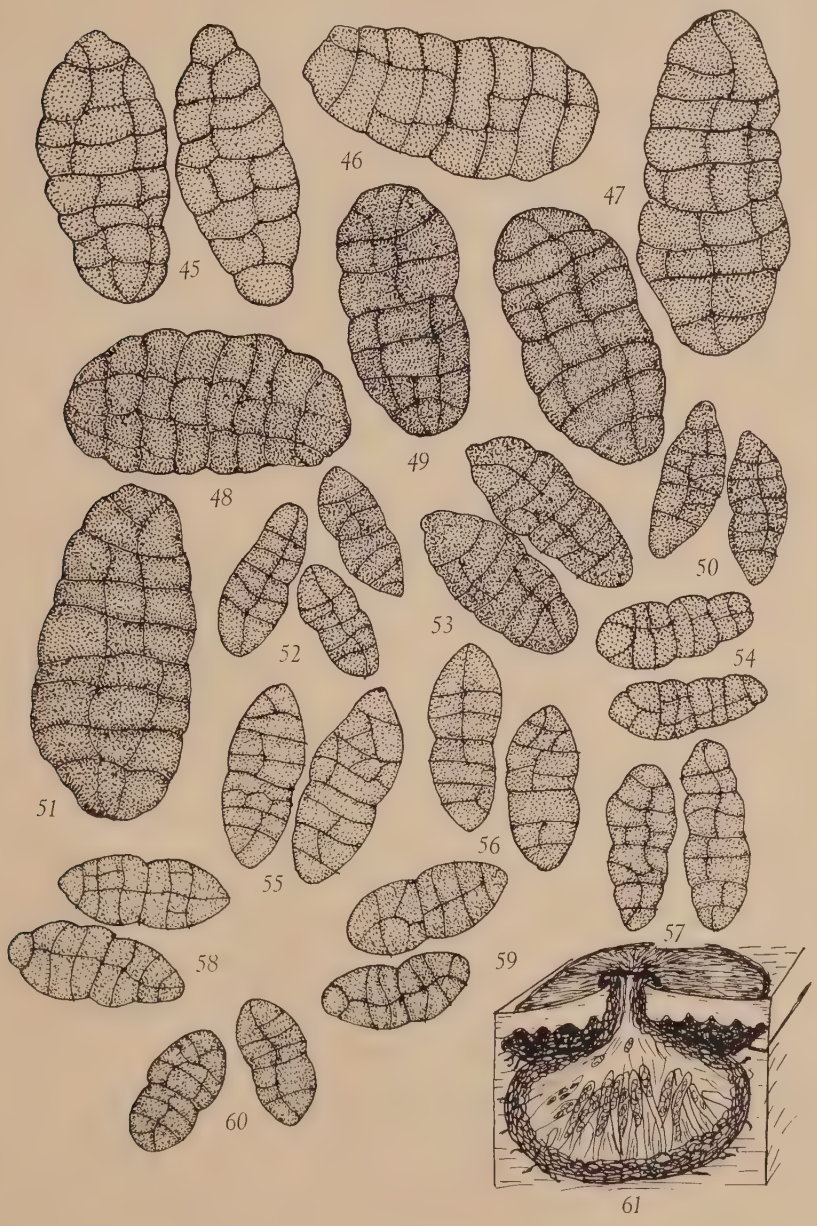
EXPLANATION OF FIGURES

FIG. 45. Spores from a collection (*251*) of *P. armeriae* (Rab.) Ces. & deNot. FIG. 46. Spores from a collection (351) of *P. armeriae* (Rab.) Ces. & deNot. FIG. 47. Spores from a collection (*242*) of *P. balsamorrhizae* Tracy and Earle (isotype). FIG. 48. Spores from a collection (*494*) of *P. escaleriana* Frag. (type). FIG. 49. Spores from a collection (502) of *Pyrenophora silenes* Frag. (type). FIG. 50. Spores from a collection (*96*) of *Pleospora obtusa* (Fck.) Hohn. FIG. 51. Spores from a collection (*495*) of *Pyrenophora depressa* var. *stachydis* Frag. (type of form). FIG. 52. Spores from a collection (86) of *Teichospora obtusa* Fck. FIG. 53. Spores from a collection (*115*) of *Pyrenophora ephedrae* Speg. FIG. 54. Spores from undetermined collection (*281*) on Sorbus. FIG. 55. Spores from a collection (*112*) of *Pleospora laricina* Rehm (type). FIG. 56. Spores from a collection (*93*) of *P. pustulans* E. & E. (type). FIG. 57. Spores from an undetermined collection (*439*) on *Sorbus*. FIG. 58. Spores from a collection (*103*) of *P. rhodotypi* Tehm. inedit. FIG. 59. Spores from a collection (*92*) of *P. rubicola* Syd. (isotype). FIG. 60. Spores from a collection (*270*) of *P. thuemeniana* Sacc. FIG. 61. Radial section of a perithecium of *P. phragmospora* (Dur. & Mont.), Ces., to show clypeus formation.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the ostiole of Corda's specimen, which are not true setae. Through the kindness of Dr. A. Pilat, the type (*545*) of *Sphaeria armeriae* Cda. has been seen and examined. It contains a number of perithecia but they all seem to be immature. The spores (Fig. 40) seen were immature also but of the general form above described as on *Armeria*. They were smaller in size, however, than given here for this species, but this is probably because of the immaturity of the material. In this respect the type (*195*) of *Pleospora freticola* Speg., which is given as a subspecies of *P. armeriae* by Berlese (2, p. 24) is of interest. It shows spores typical of *P. herbarum*, which would fall in that species according to the arrangement here used. It is true that *P. freticola* is on a different species of *Armeria* from a distant locality (Tierra del Fuego), but these situations indicate the vulnerability of using such host-spore-form correlations for specific differentiation. This same great variation in spore size is to be found within the collection (*248*) (Fig. 42) of *P. maritima*.

PLEOSPORA BALSAMORRHIZAE Tracey & Earle in Greene, Plant. Bakerianae *2*(1): 34. 1901.

Figs. 47–49, 51

Pyrenophora silenes Frag. Bol. Soc. Espan. de Hist. Nat. **16:** 172. 1916.
Pyrenophora depressa forma *stachydis* Frag. Ibid. **16:** 171. 1916.
Pleospora escaleriana Frag. Ibid. **18:** 80. 1918.

Perithecia small, 100–250 μ, scattered, walls membranous, sometimes slightly tomentose.

Asci saccate, becoming broad clavate, apical walls strongly thickened, base claw-like, (55) 100–160 × 25–70 μ.

Spores bi- or tri-seriate, oblong-fusoid, 7-septate, dark yellow-brown to dark red-brown, straight or inequilateral, mostly symmetric, ends bluntly rounded, scarcely or not at all constricted at the septa, 30–60 × 14–26 μ.

Collections: *242*, *243*, *247*, *494*, *495*, *502*, on various herbaceous stems, from Iran, Colorado, and Wyoming.

This group of species is separated off as a species with some misgiving. There is however a loose correlation of several tendencies found among collections coming from higher altitudes. These same tendencies can be seen to a lesser degree in similar ecologic groups with smaller spores in the varieties *ferruginea* of *P. vulgaris* and *occidentalis* of *P. herbarum*. These tendencies for the formation of larger, dark colored, more septate spores, smaller perithecia and the formation of a greater amount of stiff tomentum which grades off into setae on the perithecium continues into other species which will be discussed in later papers. The large group of collections on *Astragalus* and other hosts, from Iran and the near east, discussed by Petrak (7, 8) under the name of *P. chlamydospora* Sacc., represent this same series.

Saccardo's description of *P. chlamydospora* indicates that it belongs to this general group of forms, but his spore measurements of 35 × 18–19 μ would place it in *P. herbarum* var. *occidentalis* according to the arrangement here considered. Berlese (2, Pl. 34) figures the red-brown, seven-sepate, spores of this series, but gives them (Ibid. p. 24) as being 45–52 × 22–25 μ, which would place the species with *P.*

balsamorrhizae and the specific epithet *chlamydospora* could take precedence, if Berlese is correct. Petrak (7, p. 447) in examining what he believed to be isotype material gave the spores as 47–55 × 20–25 μ, but stated that they were 8- to 9-septate. Petrak's (7, 8) interpretation of the species was extremely broad, including collections with spores 28–72 μ in length, with seven to twelve septa and with smooth or setose or tomentose perithecia.

The type of *Pyrenophora silenes* Frag. (*502*) has a few radiating, stiff tomentose hyphae on the perithecia but they can hardly be called setose. The spores (Fig. 49) are very similar to those of *P. kouhcherrica* (placed under *P. herbarum* var. *occidentalis*) except that some of them run over 40 μ in length, which arbitrarily places the species here.

The type (*494*) of *Pleospora escaleriana* Frag. has a basal tomentum of stiff hyphae on the perithecia. The spores (Fig. 48) found were not as large (40–55 × 15–23 μ) as the measurements given by Fragoso (50–60 × 21–24 μ). He also gives the spores as 5–8 septate. It is possible that some larger spores have the extra septum in the base which make this collection grade off into *P. njegusensis* Bub., previously discussed.

Type material of *P. balsamorrhizae* itself (*242*) has the characteristic small globose perithecia and broad saccate asci. The spores (Fig. 47) are rather light brown at first but become dark brown. A variety *perseptis*, issued by Clements (*247*) shows similar perithecia and asci but the spores show even a much greater range of variation in size and color.

The type (*495*) of *Pyrenophora depressa* forma *stachydis* Frag., has the typical small perithecia, saccate asci and dark red-brown spores of this species. The perithecia containing asci were smooth, but there were numerous small sterile sclerotial bodies present which bore an apical crown of 6–8 short stout setae. A note on this packet says "cum *P. kurdistanica* Bub. & *P. herbarum* Rab." Fragoso gave the spores of this form as 25–35 × 18–20 μ and 3- to 5-septate. The spores (Fig. 51) seen in the smooth perithecia were 42–55 × 17–21 μ and seven-septate. These may have been what Fragoso considered *P. kurdistanica* and he may have seen spores in the small setose perithecia which he described as the forma *stachydis*.

A second habitat group which shows a more constant correlation of characters is that found on woody stems. Most Pleosporas found on such substrata have larger, thicker-walled, often clustered, perithecia, numerous, long cylindric asci imbedded in interthecial strips and uniseriate spores. The collections with the *P. media* type of spore and on woody stems show certain characters in common, and an attempt has been made to group them in the following two species and four varieties.

The collections grouped under *P. obtusa* var. *obtusa* are difficult to separate from *P. media* var. *acuta*, yet many of them have been placed in the separate genus *Teichospora* because of their occurrence upon decorticated wood. The perithecia are small and the asci clavate, however. The variety *macrocarpa* shows the larger perithecia but not the uniseriate spores of the woody forms. The species, *P. obtusa*, is

based upon the spore form, which is rather narrow, often tapered below and bluntly rounded at the ends. In the var. *obtusa* the spores have a reddish-brown tinge and in the var. *macorcarpa* they are yellow-brown.

P. laricina includes a second group of woody forms, in all of which the spores are yellow-brown, rather broad and with abruptly pointed ends in most cases, and are uniseriate in the cylindric asci. They differ from the collections placed under *P. obtusa* in these characters. Here, again, varietal groups, based on the size and distribution of the perithecia can be recognized.

It should be noted that many collections with the five to seven septate *P. media* type of spore, particularly those of *P. media* var. *acuta* and *P. obtusa* var. *obtusa* have a spore form and septation which is similar to and may overlap that of such species as *P. trevoicola* and *P. punctata* of the vulgaris series. All these species are five to seven-septate and differ only in the manner in which the secondary septa are laid down in the end cells. In *P. trevoicola*, of the vulgaris series, for example, this secondary septum is laid down as a transverse wall, and, usually, no vertical wall is formed in the end cell. In the herbarum series (i.e. *P. media*) the first wall to be formed in the end cell is usually a vertical one, followed by the completion of a "Y" shaped septum or by the formation of an irregular or incomplete transverse septum. Unless a number of spores are carefully examined, it is sometimes difficult to determine to which group a given collection belongs, for irregularities do occur.

PLEOSPORA OBTUSA (Fck.) Höhn. in litt. ad Rehm
Ann. Myc. *3:* 230. 1905.

Figs. 50, 52–54, 57

Perithecia 200–600 (900) μ in diameter, globose, scattered or clustered, found immersed in the bark, beneath the periderm or in the wood fibers, with papillate to stout conic ostioles, soon erumpent, superficial, walls often quite thick (20–100 μ), consisting of black-walled parenchyma, sometimes slightly tomentose.

Asci clavate to cylindric-clavate, with a slightly thickened apical wall and a claw-like base, 75–125 × 12–16 (18) μ.

Spores biseriate or finally overlapping uniseriate, fusoid-ellipsoid, five- to seven-septate, yellow-brown or red-brown, straight or somewhat inequilateral, often asymmetric, with the upper portion broader and the lower portion narrower and more tapered, ends rounded bluntly tapered, with vulgaris type secondary septa in the central cells and vertical or "Y" shaped septa in the end cells, 18–26 (28) × 7–9 μ.

This species differs from *P. laricina* in the more clavate asci with biseriate spores and the more symmetric spores with rounded ends.

var. **obtusa** Figs. 50, 52, 53

Teichospora obtusa Fck. Symb. Myc. Nachtr. **2:** 30. 1873.
Strickeria obtusa (Fck.) Wint. in Rab. Krypt-Fl. **1**(2): 282. 1887.
Pleospora ephedrae Speg., non Fabre Myc. Arg. 2 (Anal Soc. Cient. Arg., ser. 3, **1:** 72.) 1902.
Pleospora ephedriicola Speg. Myc. Arg. No. 1385.

Perithecia 200–400 μ diametro, globosa, ostiolo papillaeformi vel late conico; parietibus crassis. Asci clavati, 75–125 μ longi, 12–16 (18) μ crassi. Sporae biseriatae vel ultimo imbricatae et uniseriatae, ferrugineae vel fuscae, rectae vel inaequilaterales, apice late rotundatae, basi angustatae, 18–26 (28) μ longae, 7–9 μ crassae. Ceterum ut in specie.

Perithecia 200–400 μ in diameter, globose, with rather a stout conic ostiole, scattered. Asci as in species, 75–125 × 12–16 (18) μ. Spores biseriate or finally overlapping uniseriate, fusoid-ellipsoid, brown to red-brown, straight to somewhat inequilateral, often somewhat asymmetric, with upper portion broader, lower portion gradually tapered, ends rounded or bluntly tapered, 18–26 (28) × 7–9 μ; otherwise as in species.

Collections: *63*, *86*, *87*, *96*, *102*, *115:* on *Ephedra*, pine wood and pasteboard, from central Europe and Argentina.

This is a wood inhabiting form with spores similar to *P. media* var. *acuta*. The perithecia although thick-walled and often erumpent-superficial, are not very large and the spores are biseriate in the clavate asci. Collections *86*, *87*, *96*, and *102* of *Teichospora obtusa* Fck., all show the perithecia to be formed within the wood fibers and then erumpent. Höhnel and Rehm were correct in considering this a *Pleospora*. Spegazzini's collections of his *P. ephedriicola*, which was first described as *P. ephedrae*, show the same sort of spores in small thick-walled, usually clustered perithecia, which are beneath the periderm in the type collection (*63*) and immersed in the surface fibers of bark or wood in the later collection (*115*) (Fig. 53). This variety differs from the following species in the more narrow clavate, asymmetric form of the spore with gradually tapered but rounded ends, the more definite appearing septa and redish-brown color, and biseriate arrangement in clavate asci.

var. **macrocarpa** var. nov. Figs. 54, 57

Perithecia magna, 250–600 (900) μ diametro, plerumque in cortice acervata; ostiolo brevi, latoque; pariete 30–100 μ crasso, ex cellulis parenchymatis atris constituto. Asci clavati, 75–110 μ longi, 17–18 μ crassi. Sporae biseriatae, oblonge ellipsoidales, lutei-brunneae, plerumque rectae asymmetricae sursum latae, deorsum angustatae, utrinque plerumque rotundatae. Ceterum ut in specie. Specimen typicum sub numero 281 infra in enumeratione locorum. In caulibus *Sorbi*, in Suecia.

Perithecia larger, 250–600 (900) × 250–400 μ, usually clustered and immersed in the bark, ostioles short stout; walls 30–100 μ thick of black parenchyma.

Asci clavate, as in species, 75–110 × 17–18 μ.

Spores biseriate, oblong-ellipsoid, yellow-brown, mostly straight but asymmetric, broader above, narrower and tapered below, ends mostly rounded, 21.5–26 (28) × 8–10 μ, otherwise as in species.

Collections: *281*, *439:* On *Sorbus*, from Sweden.

This variety as typified by these two collections is somewhat intermediate between the var. *obtusa* and the next species. The spore form is that of the var. *obtusa*, but the spores (Figs. 54, 57) are yellow rather

than red-brown and are more asymmetric but straight in form. The perithecia are also often larger. This var. differs from the following species in the biseriate spores which are more asymmetric and have more rounded ends.

PLEOSPORA LARICINA Rehm Hedw. *21:* 121. 1882.
Figs. 55, 56, 58, 59

Perithecia 200–900 μ in diameter, globose to somewhat flattened-globose, ostiole short, stout, scattered singly or clustered to confluent, remaining immersed or erumpent, exposed; wall usually rather thick, parenchymatic, with an inner hyaline layer.

Asci rather long cylindric, apical wall slightly thickened, base claw-like, usually numerous and imbedded in interthecial strands, 90–170 × 10–18 (21) μ.

Spores uniseriate or overlapping uniseriate, broad fusoid-ellipsoid, yellow-brown to dark yellow-brown, five to seven-septate, mostly straight and symmetric, occasionally slightly asymmetric or inequilateral, constricted at the central septum only, one or both ends abruptly pointed, 18–26.5 × 8–12 μ. Often with irregular septation.

This species is separated on the difference in spore form and color which is shown by a rather large group of collections, which also show the long cylindric asci of the wood inhabiting forms. There is a wide range of difference in perithecial size and arrangement which is recognized by a varietal separation.

var. **laricina** Fig. 55

Pleospora pustulans E. & E. Journ. Myc. **4:** 76. 1888.

Perithecia magna, 300–500 μ diametro, globosa, vel oblate globosa, interdum tomentosa, sub peridermatem immersa; pariete 30–100 μ crasso, parenchymatico, intus hyalino, cum pseudoparaphysatibus pleno; ceterum ut in specie.

Specimen typicum sub numero 112 infra in enumeratione locorum. In caulibus *Laricis*, in regione Tyrolensi.

Perithecia large 300–500 μ, spheric or somewhat flattened, sometimes with a slight tomentum, scattered singly beneath the periderm; wall 30–100 μ thick, parenchymatic with a hyaline inner layer and filled with numerous interthecial strips. Asci and spores as in species.

Collections: *93*, *112* (Type), *341*, *344;* On *Sarothamnus*, *Salix*, *Fraxinus* and *Larix*, from Tyrol, Scandinavia and New York.

These collections represent the occurrence of this species on larger woody stems of tree and shrub hosts. The spores (Fig. 55) are similar to the following variety but somewhat more symmetric.

The type (*112*) of *P. laricina* has large scattered often erumpent-superficial perithecia and the spores (Fig. 55) are 23–26 × 9–12 μ rather than 30 × 16 μ as given by Rehm. The type of *P. pustulans* (*93*) has more clustered, barely erumpent perithecia formed on the inner bark surface. The collection (*341*) on *Sarothamnus* has smaller (300–400 μ) and thickly scattered perithecia and narrower (23–26 × 7.5–8.5 μ) spores and is somewhat intermediate between the two varieties. The collection (*344*) on *Salix* is somewhat immature and no asci were seen.

var. **nitida** comb. nov. Figs. 58, 59

Teichospora nitida E. & E. Proc. Phila. Acad. Sci. 1895: 419.
Pleospora rubicola Syd. Hedw. **39**: (1). 1900.
Pleospora rhodotypi Rehm in Herb.
Pleospora nitida (E. & E.) Rehm. Can. Journ. Res. C, **20**: 585. 1942.

Perithecia minuta, 200–300 μ diametro, saepe brunnei-tomentosa, casespitosa vel confluentia, interdum gregatim erumpentia per rupturam corticis; ceterum ut in specie.

Specimen typica sub numero 163 infra in enumeratione locorum. In caulibus *Rubi*, in republica Virginiana Occidentali.

Perithecia smaller, 200–300 μ in diameter, often with some brown tomentum, clustered to confluent, sometimes erumpent in groups through a common rupture of the overlying tissue; otherwise as in species.

Collections: *91*, *92*, *97*, *103*, *163* (Type of var.); on *Rubus*, *Rhodotypus*, *Opulaster*, from Central Europe, West Va., and Colorado.

This variety has small clustered perithecia and occurs on small woody stems of shrubby hosts. The type (*163*) of *Teichospora nitida* shows superficial perithecia which have been exposed by the exfoliation of the periderm. The spores (19.5 × 7 μ) and asci (90–95 × 10–12.5 μ) are at the lower end of the range for this variety, but this material is immature which explains these discrepancies. A portion of the type collection of *P. rubicola* (*92*) shows the characteristic clustered perithecia erumpent as elongate groups of ostioles. The spores (Fig. 59) of this collection, however, are 19.5–24 × 9–10.5 μ and not 26–42 × 10–18 μ, as given by Sydow.

The collection (*103*) labelled *P. rhodotypi* shows more scattered perithecia but the same spores (Fig. 58) and asci. Rehm's collection (*91*) of *P. aculeorum* shows the typical perithecia, grouped on stems of *Rubus*.

Berlese (1, p.79) described *P. aculeorum* as on *Rosa* and figures (2, Pl. 19, fig. 3) scattered perithecia and biseriate spores in a clavate ascus which throws some doubt on the identity of his species and the variety here in mind.

Pleospora phragmospora (Dur. & Mont.) Ces. in Rab. Fung. Eur. 1543.

Figs. 60, 61

Sphaeria phragmospora Dur. & Mont. Fl. Alg. 520 & Syll #864.
Pleospora agaves deNot. Sfer. Ital. 73. 1863.
Pleospora rebissia deNot. Sfer. ital. 73. 1863.
Pleospora ovoidea Niessl Contr. fl. myc. Lusit. 12.

Perithecia 300–500 × 300 μ, somewhat flattened-spheric, immersed within the parenchyma of the leaf, and appearing upon the surface as scattered circular black spots caused by a clypeus-like, stromatic blackening of the host tissues about the ostioles to a thickness of 100 μ; the cuticle is not discolored. Perithecial walls 30–50 μ thick, of dark brown parenchyma; ostiole short stout cylindric, erumpent.

Asci long cylindric, apical wall slightly thickened, base claw-like, 88–96 × 7–9 μ, immersed in numerous filiform interthecial strips.

Spores overlapping biseriate, ellipsoid, five- to seven-septate, dark

yellow-brown, straight or slightly inequilateral, symmetric or slightly asymmetric, constricted only at the central septum, ends broadly rounded, end cells mostly with vertical septa 17–23 × 8–9 μ.

Collection: *270:* on Agave (or *Yucca*), from Mexico.

The use of this binomial and synonymy for this collection is provisional and may be incorrect. All of these species, as well as *P. principis* Pass., on *Yucca*, have the broad ovoid five to seven-septate, *P. media* type of spore as found in this collection (fig. 60), but none of them are described with the clypeus-like black, stromatic ring about the ostiole as found here. This may be a host reaction, for the same structure exactly is found in collection No. *21*, which was described as *Pleospora clypeata* (14). The spores of collection No. *270* are also smaller than those of the preceeding species.

Berlese gives *P. agaves* and *P. orvoidea* as synonyms of *P. phragmospora* and figures (2; Pl. 22, fig. 3 & Pl. 25, fig. 1) this type of spore for both that species and *P. principis*, but shows biseriate spores in clavate asci for both species. De Notaris (3, fig. 78) figures cylindric asci with uniseriate spores for his *P. agaves*. His *P. rebissia* (l.c., fig. 79) seems to differ in the smaller perithecia. One spore figure appears like the edge view of a clathrate spore. The type collection was apparently immature material.

A packet (No. *213*), in the Sydow Herb. appears to be a portion of the type of *P. principis*, and is a typical *P. herbarum*, without any clypeate blackening. Only an examination of the types of the species on *Agave* can determine their identity as *P. herbarum* or as the same as No. *270*.

TABLE 1

Coll. No.	Host	Spores	Asci	Perithecia
		Pleospora infectoria		
53	Secale, etc.....	15–18 × 6–7	71–100 × 11–13	200–250
342	Lloium.....	16–18 × 6–7	75–90 × 12.5	150–300
449a	Secale.....	16–18 × 7	90–125 × 11–12	300–350
55	Secale.....	16–18 × 7–9	78–90 × 12.5–14	250–500
480	Secale.....	16–19 × 6.5–7	75–95 × 12.5	150–300
440	Secale.....	17–18 × 6–7.5	106 × 14	250–400
331	Avena.....	17–20 × 5.5–7	55–85 × 10–12.5	250–350
333	Melica.....	17–23 × 7		
		Pleospora socialis		
50	Allium.....	14–18 × 6.5–7	75–95 × 10–11	200–300

TABLE 1—(Continued)

Coll. No.	Host	Spores	Asci	Perithecia
		Pleospora vulgaris		
	var. *vulgaris*			
51	Myricaria	14–18 × 6–7	75–88 × 10–12.5	200–300
349	Cirsium	15–18 × 7	70–89 × 12.5	200–250
57	Sedum	15–21.5(23) × 7.5–9	78–90 × 12.5	200–300
54	Mespilus	16–18 × 5–6	70–85 × 8.5–11	150–200
56	Catalpa	16–20 × 7–8	70–80 × 10–14	150–200, t
58	Vicia	(14)17–20 × 6–7	70–90 × 11–13	200–250
59	Erysimum	17–21.5 × 7–7.5	60 × 12–14	150–350
171	Rumex	17–21.5 × 7–8	85–95 × 11–13	250
64	Phacelia	17–20(23) × 6.5–7.5	70–78 × 12.5–15	175–250
65	Saccharum	17–24 × 7–8	70–78 × 10.5–12.5	200–250
172	Festuca	18–21.5 × 6.5–8.5	80–115 × 12.5–14	200–300
66a	Dianthus	18–21 × 7.5–8.5		
452	Limonum	18–25 × 7–8.5	80–110 × 11–14	200–300
	var. *ferruginea*			
62	Penstemon	17.5–21 × 7–9	75–120 × 14–18	300–350
67	Bupleurum	18–23 × 7–8.5	70–88 × 16–19	250–350
72	Castilleja	19.5–24 × 7.5–9	70–85 × 14–18	200–350, T
73	Pedicularis	19.5–25 × 8.5–10.5	75–90 × 16–17	250–350, t
74	Aquilegia	19.5–23(26) × 7–9	70–80 × 16–18	250–300, t
167	Draba	20–25 × 8.5–9.5	60–65 × 16–19	150–200, t
99	Pentstemon	20–26 × 8–10.5	78–90 × 14–18	250–350, T
79	Grindelia	21.5–28 × 9.5–11	78–90 × 21–23	120–200, T
80	Osmorrhiza	23–25 × 9–11		200–250
		Pleospora richtophensis		
257	Achillea	26–30 × 9–11.5	75–90 × 30–35	300–350
260	Helianthus	26–32(34) × 10.5–13	80–88 × 22–25	250–350, T
258	Aster	26–35 × 11–12	75–90 × 24–26	250–400, t
259	Senecio	26–32 × 9–11	78–90 × 20–22	250–400, T
261	Gillia	28–32 × 10.5–13	90 × 26	150–200
262	Machaeranthera	28.5–35 × 11–14	85–95 × 25–27	220–300, T
263	Helianthella	28–35 × 11–13	120–130 × 24–26	300–450, T
264	Achillea	28.5–32 × 10–11	88–100 × 21–24	300–400, T
265	Erigeron	30–34 × 11–13	85–95 × 21–23	300–400, t
267	Osmorhiza	30–35(37) × 11–14	78–110 × 20–22	350–400, T
266	Agastache	30–35 × 12.5–15	120–140 × 25–31	350, T
268	Umbellifer	30–39 × 12–13	100–120 × 23–27	200–350, T
547	Helianthus	32–35 × 12–14	85–105 × 12–13	250–350, T
264a	Achillea	35–38 × 12.5–15	85–120 × 21–26	250–500, T
269	Senecio	35–40 × 12.5–14	134–150 × 27–32	300–400
	var. *pallida*			
534	Rannunculus	26–32 × 11–14	85–95 × 26	300–400
536	Aster	35–44 × 14–17	125–195 × 26–28	300–400, T

TABLE 2

Coll. No.	Host	Spores	Asci	Perithecia
		Pleospora media		
	var. *acuta*			
442	Melica	17–21.5 × 7	70–85 × 12.5–14	200–250
321	Scorzonera	19.5–23 × 7–8.5	60–70 × 14–17	250–300
71	Juncus	19.5–23 × 8.5–10.5	90–120 × 18–20	200–350
75	Juncus	21–25 × 8–9	105–125 × 13–18	
107	stems	21.5–25 × 8.5–9	75–78 × 16–18	200–250, T
322	Campanula	22–26.5 × 8.5–9.5	70–88 × 14	250–300
	var. *obtusa*			
170	herbs	14–17 × 7–8	85–110 × 9–12	200–400, T
428	Veronica	14–18 × 6–7	55–70 × 14	180–200, T
70a	Phaca	19.5–21 × 9–10.5		
69	Tunica	19.5–21.5 × 8.5–10	85–100 × 9–12	200–300
94	Lupinus	19.5–24 × 9–12	62–70 × 16–18	180–200, T
76	Inula	21–26.5 × 8–9	70–78 × 17–29	120–150
100	Chuquiraga	21–25 × 8.5–10	70–85 x 16–18	100–200, t
183	Brassica	21.5–26.5 × 10.5–12	105–115 × 26–28	200–300
500	Solidago	21.5–26.5 × 12.5		250–300
125	Astragalus	22–26 × 10–12	78–90 × 20–24	200–250, T
111	Agastache	22–24(28) × 9–12	81–110 × 17–20	200–250, t
177	Herniaria	22–26.5 × 9–12	85–110 × 21–26	150–175
179	Beta	23–26 × 10.5–12.5		250–400
180	Lonicera	23–26.5 × 10.5–12.5	104–140 × 17–21.5	200–350
84	Bupleurum	23–28.5 × 10–12.5	85–110 × 23–26	150–250
184	Syringa	24.5–28.5 × 10–13	100–110 × 21–26	150–200
453	Citrus	20–29 × 12.5–14	90–115 × 18–21	200–300
	var. *media*			
40a	herb	16–21 × 7.5–9	70–90 × 14–15	150–250, T
491	Zygadenus	17.5–19.5 × 8–9	70–74 × 12.5–14	175–200
88	Castilleja	18–23 × 7–12	70–90 × 19–23	200–300, T, s
68	Laserpitium	19–21.5 × 7–9	62–70 × 16–18	200–250, T
90	Senecio	19–22 × 8–10	70–78 × 19–22	150–250
89a	Lepidium	19–22 × 8–9	78–88 × 14–17	200–250, t, S
98	Rudbeckia	19.5–26 × 9–10	62–70 × 16–18	200–300, t
109	Penstemon	21–24(26) × 10–11	65–70 × 17–21	100–200, t
101	Clematis	21–26 × 10–12	78–88 × 21–23	150–200, t
77	Androsace	21–26.5 × 12.5–14	100 × 20–33	150–200
78	Androsace	21–26.5 × 12.5–14	100–140 × 23–25	150–200
173	Clematis	21–26(28) × 10.5–12	70–78 × 20–27	200–250
104	Penstemon	21–28 × 9–12.5	85–96 × 21–22	200–250, t
105	Dickia	21–29 × 9–13	70–85 × 14–17	200–250
106	Castilleja	21.5–24.5 × 8–11	78–88 × 17–19	200–300, T
110	Castilleja	22–27 × 9.5–11	70–78 × 16–18	150–200
81	Eucephalus	23–26 × 9–12	75–90 × 19–23	200–300, t
343	Artemisia	23–27 × 11–12.5	70–80 × 26.5	150–200
116	Anaphalis	23–27 × 10.5–11.5	80–90 × 21–22	300, t
83	Solidago	23–25 × 10–12	78–88 × 19–21	200–300
117	Thermopsis	25–26(28) × 9.5–11	85–106 × 18–21	300
85	Artemisia	24–27 × 12–12	85–90 × 26–28	150–170

TABLE 3

Coll. No.	Host	Spores	Asci	Perithecia
		Pleospora herbarum		
	var. *herbarum*			
176	Salicornia	21–26(40) × 11–12	105–130 × 26.5	200–250
174	Salicornia	21–26(35) × 9–12	90–110 × 26–28	250–300
175	Salicornia	21–26(37) × 8.5–11	85–120 × 18–23	300
178	Gymnocladus	23–30 × 10.5–12	106–115 × 22–26	200–300
113	Sagina	23–26(32) × 9–11	78–90 × 21–23	150–200, T
188	Aristolochia	23–26(32) × 10.5–12.5	85–95 × 21–23	200–300
169	Vicia	23–32 × 7.5–10	125 × 24–26	300–400
181	Campanula	23–32 × 10.5–15	90–130 × 26.5	250–400
182	Foeniculum	23–33 × 11–13	125 × 26	200–300
191	Cheiranthus	23–33.5 × 11–12.5	106–125 × 23–26	300–400
185	Lobelia	24–32 × 11–13		300–400
186	Melilotus	25–28.5 × 11–14	120–150 × 23–25	300–400
225	stems	25–30 × 12.5–14	85–106 × 23–26	350–450
203	Colutea	25–30 × 10.5–12.5	65–90 × 26–35	200–250
187	Draba	25–30 × 11–12.5	90–115 × 25–26	250–300
190	Alstroemeria	25–32 × 10.5–12.5	110 × 25	250–350
189	Allium	25–32 × 11–14	106–160 × 26–30	300–400
323	Primula	25–35 × 10.5–16	115–135 × 26.5	300–400
238	Brassica	25–35 × 11–14	160–190 × 23–26	350–400
206	Hierochloa	26–30 × 9–11.5	95–110 × 23–26	150–200
189	Lepidium	26–30 × 12–13	95–115 × 30–32	200–250
193	Acacia	26–30 × 11–14	100–110 × 26	200–250
192	Rumex	26–30 × 11–14	115–135 × 20–26	250–350
194	Leontodon	26–31 × 12.5–14		250–400
204	Ailanthus	26–32 × 12–14	106–140 × 27–30	200–300
197	Melia	26–32 × 12.5–14	110–130 × 26–28	150–250
196	Melilotus	26–32 × 12–13	140–160 × 26	400–500
208	Pentopanax	26–32 × 12.5–14	106–140 × 23–26	
195	Armeria	26–32 × 11.5–12.5	95–110 × 25–30	250–350
205	Allium	26–33.5 × 12.5–14	95–140 × 26–33.5	400–500
198	Baccharis	26–34 × 12.5–14	124–160 × 26–30	300–400
199	Piptochaetum	26–34 × 11–12.5	106–125 × 23–26	350
216	Trifolium	26–34 × 12.5–14	70–120 × 20	350–450
210	Capsana	26–35 × 11–14	95–145 × 26	250–350
200	herbs	26–35 × 10.5–12	110–130 × 26	250–400
202	Salicornia	26–35 × 12–14	90–110 × 26–28	300–400
201	Allium	26–35(39) × 10.5–14	105–140 × 21–26	250–400
209	Vicia	26–36 × 11–14.5	160–210 × 23–26	300–400
211	Acantholimon	26–37 × 13–14	100–110 × 26	200–250
213	Phoenix	26.5–30 × 10–13	100–140 × 20–29	300
207	Iliamna	26.5–32 × 12.5–16	88–110 × 21–26	200–250
214	Fraxinus	26.5–32 × 11–14	100–110 × 24–26	250–400
345	Lonicera	26.5–33 × 12.5–14	90–110 × 20–25	250–300
50a	Allium	26.5–35(39) × 12.5–14	120–145 × 25–30	300–450
217	Allium	27–34 × 9–13	160–190 × 23–26	250
218	Evonymus	27–35 × 11–12.5	96–115 × 26–30	200–250
215	Foeniculum	27–32 × 12.5–14		300–350
220	Verbascum	(26)28–30 × 12–14	88–125 × 25–26	200–350
219	Triglochin	(23)28–32 × 13–14	85–140 × 26–30	300–350
221	Salicornia	28–33 × 12.5–14	140–175 × 26–28	200–300
66a	Dianthus	28–33 × 13–14	75–85 × 21	250–300
222	Dracaena	28–33 × 13–14	135–160 × 26–32	200
230	Puya	28–33(37) × 11–12.5	90–105 × 25–29	200–300
336	herbs	28–34 × 12.5–14	90–110 × 26–30	250–275
212	herbs	(26)28–35 × 12.5–14	125–180 × 21–26	200–300
544	Gutierrezia	28–35 × 14.5–16	90–105 × 26–28	175–250

TABLE 3—(Continued)

Coll. No.	Host	Spores	Asci	Perithecia
223	Salsola.....	28–35 × 10.5–14	106–125 × 26	150–250
224	Erythrina.....	28–35 × 12.5–14	115 × 26	250
253	Allium.....	28–35 × 12.5–16	140–150 × 28	300–400
236	Humulus.....	28–39 × 12.5–14	150–180 × 26–30	300–450
226	Trifolium.....	28.5–32 × 12.5–14		350–400
227	Anethum.....	28.5–34 × 11–14.5	170–190 × 26	300–350
229	Trifolium.....	28.5–35 × 11–14	130–150 × 26–30	350–450
228	Phyteumatis.....	28.5–35 × 12.5–14	100–125 × 23–27	300–350
231	Trifolium.....	30–34 × 12.5–14		350–450
233	Bromus.....	(26)30–35 × 13–14	100–130 × 25–29	300–400
235	Reseda.....	30–35 × 11–14	100–110 × 23–26	300–400
234	Plantago.....	30–35 × 11–14	125–140 × 26–28	200–250
232	Rumex.....	30–35 × 12.5–14		4–500
237	Paspalum.....	30–38 × 13–16	150–180 × 26–30	300–450
249	Vicia.....	30–40(49) × 12.5–15	120–160 × 30–35	300–500
240	Culcidium.....	32–37 × 11–14	120–210 × 26–28	300–350
239	Lupinus.....	32–36 × 10.5–16	180 × 31	300–500
245	Marrubium.....	32–37(41) × 13–14	150–210 × 30–35	300–400
241	Allium.....	32–38 × 11–15	178–215 × 21–26	300–400
250	Lychnis.....	33–39 × 12.5–16	93–125 × 30–32	300–400
	var. *occidentalis*			
118	Sphaeralcea.....	25–34 × 12.5–16	88–97 × 23–26	250–350
119	Pericomes.....	26–28 × 10–11	90–100 × 20–25	250–350, T
124	Proustia.....	26–30 × 12–13	85–95 × 20–25	200–250
126	Chrysopsis.....	26–30 × 12.5–14	85–90 × 28	200–300
114	Umbellifer.....	26–31.5 × 12–14	110–135 × 18–22	200–400
127	Eriogonum.....	26–32 × 11–13	100–125 × 26	200–250, s
128	Lupinus.....	26–32(37) × 12.5–16	88–97 × 23–26	250–350
129	Lupinus.....	26–33 × 10.5–12.5	98–110 × 26–28	300–350
131	Agastache.....	27–35 × 12.5–14	110–145 × 24–36	300–400
133	Senecio.....	28–34 × 12.5–16	100–145 × 26–32	150–300
132	Pedicularis.....	(26)28–33 × 10–12.5	90–120 × 20–26	100–200, S
134	Penstemon.....	(24)28–5 × 12.5–16	88–96 × 18–26	150–400
499	Dianthus.....	29.5–35 × 12.5–16	110–125 × 35–40	150–200
493	Nepeta.....	30–36 × 14.5–17	110–140 × 25–35	250–400
135	Horkelia.....	32–35 × 14–16	105–135 × 33–35	200
420	Capparis.....	34–40 × 12.5–14	78–88 × 26–30	150–250
		Pleospora armeriae		
125a	Astragalus.....	23–40 × 14–19	125–140 × 23–38	200–250, T
248	Triglochin.....	23–48 × 11–19	130–160 × 26–28	250–300
545	Armeria.....	26–33 × 13–14	78–88 × 37–47	150–200
244	Polemonium.....	30–39 × 14–19	115–125 × 35	200–250
351	Armeria.....	32–40(42) × 16–20	110–125 × 35–39	250
443	Perezia.....	35–44 × 16–18	115–140 × 23–28	200–300
254	Plantago.....	35–48(53) × 15–17	150–160 × 50	300–400
479	Plantago.....	37–47 × 16–18	115–145 × 42–50	200–250
251	Armeria.....	38–45(50) × 16–21	140–150 × 35–40	200–250
256	Triglochin.....	(35)42–48 × 15–20	200–300 × 40–50	300–400
		Pleospora balsamorrhizae		
502	Silene.....	28.5–43 × 14–19	90–110 × 25–38	100–150
243	Pseudomycopteris	32–42 × 14–18	105–160 × 35	100–200
242	Balsamorrhiza...	35–50 × 16–23	110–150 × 62–70	200, t
494	Astragalus.....	40–55 × 15–23	55–140 × 44–59	100–250
495	Stachys.....	42–48(55) × 17–21	78–105 × 79–95	90–150
247	Balsamorrhiza...	46–60 × 21–26	180 × 70	200–250, t

TABLE 4

Coll. No.	Host	Spores	Asci	Perithecia
		Pleospora obtusa		
	var. *obtusa*			
63	Ephedra	17–23 × 7.5–8.5	85–125 × 12.5–16	200–400
86	Pine boards	17–26 × 7–10	80–105 × 12–16	200–250
87	Pine boards	18–23 × 7.5–9		
96	Pine boards	19.5–25 × 7–9	80–105	200–300
102	Pasteboard	21–26 × 6.5–7.5	75–90 × 14–16	200–250
115	Ephedra	24–28 × 10.5–11.5		100–150
	var. *macrocorpa*			
439	Sorbus	21.5–26 × 9–10	75–95 × 17–18	250–300
281	Sorbus	21.5–26(28) × 8–9	90–110 × 17–18	300–600, T
		Pleospora laricina		
	var. *microcarpa*			
163	Rubus	17.5–19.5 × 6.5–7	90–95 × 10–12.5	200–300
91	Rubus	19.5–23 × 9.5–10.5	106–130 × 10.5–12	250–300
92	Rubus	19.5–24 × 9–10.5	90–160 × 11–14	200–300
97	Opulaster	19.5–26 × 8.5–12	90–110 × 21–23	250–400
103	Rhodotypus	21–26.5 × 8.5–10.5	100–125 × 12.5–16	200–250
	var. *laricina*			
93	Fraxinus	19.5–24 × 8–9	85–125 × 12–14	400–450
341	Sarothamnus	23–26 × 7.5–8.5	110–145 × 12–13	300–400, T
344	Salix	23–26.5 × 8.5–10		250–400
112	Larix	23–26.5 × 9–12	140–170 × 17–18	400–500
		Pleospora phragmospora		
270	Yucca or Agave	17–23 × 8–9	88–96(106) × 7–9	300–500

COLLECTIONS CITED

40a. *Pleospora oblongata* Niessl, on herbaceous stems. May, 1900, leg. Rehm (Riksmusett: Herb. Rehm); second fungus.

50. *Pleospora socialis* Kze., on *Allium cepa*, Huntberge pr. Islebiam (Sax. Vor.), 1876, leg. J. Kunze (Riksmuseet: Rehm Asc. 385; Kze. Fung. sel. 70). (Type).

50a. A second fungus.

53. *Pleospora infectoria* Fck., on *Secale*, *Hordeum*, etc., Oestrich (Nassau). (Farl.; Herb. Boiss, ex Herb. Fck.: Fung. Rhen. 2246) (Type).

54. *Pleospora araucana* Speg., on leaves of *Mespilus germanica*, Victoria, Chile, July, 1922 (La Plata Mus. 7178). (Type).

55. *Pleospora infectoria* Fck., on *Secale serrata*, Kōnigstein u. Nossen, April, 1887, leg. W. Krieger, (Farl.: Kreig. Fung. Sax. 280).

56. *Pleospora spegazziniana* Sacc., on *Bignonia catalpae*, Conegliano, Italy, March, 1876, (No. 87), (La Plata Mus. 2157) (Type). (With *Diplodia catalpae* Speg.)

57. *Pyrenophora sedi* Toum. & Brun., on *Sedum alba*, Gallia, Saintes, Charente-inferieure, March, 1885, leg. P. Brunaud (Riksmuseet: Herb. Sydow) (Type).

58. *Pleospora leguminum* Rab., on *Vicia sativa*, Bayreuth, Bavaria, 1875 Thuemen (Riksmuseet: Thuem. Myc. Univ. 268).
59. *Pleospora minuta* (*microsomatica*) Kirschst., on *Erysimum repandum*, Havelufer, bei Rathenow, June 16, 1905, leg. Kirschstein (Riksmuseet: Herb. Kirschst.) (Type).
62. *Pleospora vulgaris* Niessl, on *Pentstemon glaber*, Camp Davis, Jackson, Wyo., June 18, 1940 (Wehm. Herb. 1016a).
63. *Pleospora ephedrae* Speg., *Ephedra ochreata*, La Plata, Argentina, May, 1902, (La Plata Mus. 2183: sub *P. ephedricola*).
64. *Pleospora infectoria* Fck., on *Phacelia circinata*, los Perales, Chile, leg. Spegazzini (La Plata Mus. 716M).
65. *Pleospora infectoria* var. *sacchari* Speg., on *Saccharum officinarum*, Tecuman, Argentina, April, 1894 (La Plata Mus. 4163) (Type of var.).
66. *Pleospora dianthi* Not., on Dianthus, Wald bei Sutsenthal; June, 1866, leg. Rehm (Riksmuseet: Herb. Rehm).

66a. Same data, second fungus.

67. *Pleospora vulgaris* Niessl, on *Bupleurum americanum*, Camp Davis, Jackson, Wyo., July 4, 1940 (Wehm. Herb. 1220).
68. *Pleospora maireana* Lamb. & Fautr., on *Laserpitium gallicum* Gevrey (Cote-d-Or) April, 1897 (Riksmuseet: Herb. Sydow).
69. *Pleospora oblongata* Niessl, on *Tunica prolifera*, Kalkberg, July 2, 1896, leg. P. Sydow (Ritsmuseet: Syd. Myc. March. 4518).

70a. *Pleospora tragacanthae* Rab., on *Phaca frigida*, Furstenalp, Graubunden, Aug. 15, 1903, leg. A. Volkart (Riksmuseet: Rehm Asc. 440). Second fungus.

71. *Pleospora spinosella* Rehm, on *Juncus hostii*, am Taschach Gletscher, Pizthall, Rirol, 6200 m., Aug., 1875, leg. Rehm (Riksmuseet: Rehm Asc. 440) (Isotype).
72. *Pleospora vulgaris* Niessl, on *Castilleja flava*, Camp Davis, Jackson, Wyo., June 18, 1940. (Wehm. Herb. 1015.)
73. *Pleospora vulgaris* Niessl, on *Pedicularis groenlandicum*, Willow Creek, Jackson, Wyo., June 28, 1840 (Whem. Herb. 1067a).
74. *Pleospora vulgaris* Niessl, on *Aquilegia coerulea*, Hoback For. Camp, Jackson, Wyo., July 25, 1940 (Wehm Herb. 1056c).
75. *Pleospora spinosella* Rehm, on *Juncus hostii*, Perschelsee am Arlberg, 1800 m., July, 1879 (Riksmuseet: Herb. Rehm).
76. *Pleospora inulae-candidae* Jaap, on *Inula candida*, Ragusa, Dalmatia, March 15, 1914, leg. O. Jaap. (Riksmuseet: Herb. Sydow). (Type.)
77. *Pleospora phyllophila* Rehm inedit., on *Androsace helvetica*, Zachragel, in Algau (?),* July 12, 1899, leg. Ade (Riksmuseet: Herb. Rehm, No. 6).
78. *Pleospora phyllophila* Rehm inedit., on *Androsace helvetica*, Nood farte der Luiknas am Algau (?),* July 5, 1909, leg. Ade (Riksmuseet: Herb. Rehm No. 13).
79. *Pleospora compositarum* Earle, on *Grindelia*, Vacaville, Calif., May 6, 1903, (N.Y.B.G., coll. B, No. 2916; Bakers Pl. Pac. Slope 3013).
80. *Pleospora misera* Speg., on *Osmorrhiza chilensis*, Ushnaia, Tierra del Fuego, May, 1882. (La Plata Mus. No. 7242.) (Type.)
81. *Pleospora compositarum* Earle, on *Eucephalis* (*Aster*), Hermosa, Colo., Mar. 30, 1899, leg. H. F. Baker (N.Y.B.G.: Herb. S. F. Earle: Pl. S. Colo. No. 76) (Type).
83. *Pleospora compositarum* Earle, on *Solidago*, Cream Puff Mt., Jackson, Wyo., July 5, 1940. (Whem Herb. 1085.)
84. *Pleospora varians* Ces., on *Bupleurum fruticosum*, Hort. Bot. Neapolit. leg. Cesati (Riksmuseet: Herb. Sydow & Rab. Fung. Eur. 2660). (Isotypes.)
85. *Pleospora abromeitiana* Henn., on *Artemisia borealis*, West Grunland, Sermistelled-Fjord, July 3, 1891, leg. Drygalski (Riksmuseet: Herb. Sydow). (Isotype.)
86. *Teichospora obtusa* Fck., on Fichten-planken, Lagenheim, in Franken, Feb., 1869, leg. Rehm. (Riksmuseet: Herb. Rehm).
87. *Teichospora obtusa* Fck., on Fichten balken, Krumbed in Schwaben (Bayern), July, 1876, leg. Britzelmayer (Riksmuseet: Rehm Asc. 384).

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*A question mark indicates that the handwriting was illegible and the data are doubtful.

88. *Pyrenophora castillejae*, Earle, on *Castilleja*, Hermosa, Colo., March 5, 1899, leg. C. F. Baker. (N.Y.B.G.: Herb. S. F. Earle.) (Type.)
89. *Pleospora lepidiicola* Earle, on *Lepidium apetalum*, Hermosa, Colo., March 30, 1899 (N.Y.B.G.: Earle Herb.: Pl. S. Colo. 52). (Type.)
89a. Second fungus.
90. *Pleospora senecionis* Earle, on *Senecio*, Hermosa, Colo., March 28, 1899, leg. C. F. Baker. (N.Y.B.G.: Herb. S. F. Earle: Pl. S. Colo.) (Type.)
91. *Pleospora aculeorum* Berl., on *Rubus*, Neufriedenheim, April, 1900, leg. Dr. Rehm. (Riksmuseet: Herb. Rehm.)
92. *Pleospora rubicola* Syd., on *Rubus idaei*, Zehlendorf, pr. Berlin, Apr. 14, 1899, leg. P. Sydow (Riksmuseet: Syd. Myc. March 4813). (Isotype.)
93. *Pleospora pustulans* E. & E., on *Fraxinus*, Clyde, N. Y., April, 1888, leg. O. F. C. (N.Y.B.G., Ellis coll. No. 538.) (Type.)
94. *Pyrenophora setigera* (Niessl) Sacc., on *Lupinus argophyllus*, Durango, Colo., 2000 m., July 4, 1907. (Farl. Herb.: Clem. Crypt. Form. Colo. #453.)
96. *Pleospora obtusa* (Fck.) Höhn., on fichtenbalke, ———? Partenstein in Spehsart, July, 1876, leg. Dr. Rehm (Riksmuseet: Herb. Rehm).
97. *Pleospora cytisi* var. *lineata* Clem., on *Opulaster monogyna*, Minehaha, Colo., 2600 m., Aug. 7, 1905 (Farl. Herb.: Clem. Crypt. Form Colo., No. 35).
98. *Pleospora compositarum* Earle, on *Rudbeckia occidentalis*, Teton Pass Rd., Jackson, Wyo., July 11, 1940, (Wehm Herb. 1108a).
99. *Pleospora compositarum* Earle, on *Penstemon glaber*, Camp Davis, Jackson, Wyo., Aug. 3, 1940 (Wehm. Herb. 1201).
100. *Pleospora chuquiragae* Speg., on *Chuquiraga hystix*, Santa Cruz, Argentina, Feb., 1903. (La Plata Mus. 2187.) (Type.)
101. *Pyrenophora clematidis* Earle, on *Clematis lingustifolia*, Hermosa, Colo., Mar. 1, 1899, leg. C. F. Baker. (N.Y.B.G.: S. F. Earle Herb.). (Type).
102. *Pleospora obtusa* (Fck.) Höhn., on pasteboards, Augsberg, 1905, leg. Britzelmayr. (Riksmuseet: Rehm Asc. 1600.)
103. *Pleospora rhodotypi* Rehm inedit., on *Rhodotypus kerrioides*, Oct. 23, 1907 (herbst 1906?), leg. R. Gravitz. (Riksmuseet: Herb. Rehm).
104. *Pleospora compositarum* Earle, on *Penstemon stenocephalus*, Cream Puff Mt., Jackson, Wyo., July 5, 1940. (Wehm. Herb. 1086.)
105. *Pleospora praeandina* Speg., on *Dickia* sp., Mendoza, Cachueta, Feb., 1909. (La Plata Mus. 2166.) (Type.)
106. *Pleospora compositarum* Earle, on *Castilleja linearfolia*, Hoback-Snake River Junction, Jackson, Wyo., July 15, 1940. (Wehm Herb. 1159.)
107. *Pleospora infectoria f. caudata* Rehm, on plant stems, Sulden Gletscher am Ortler, July, 1886, leg. Rehm (Riksmuseet: Herb. Rehm).
109. *Pleospora compositarum* Earle, on *Penstemon rydbergii*, Cream Puff Mt., Jackson, Wyo., July 5, 1940. (Wehm Herb. 1089.)
110. *Pleospora compositarum* Earle, on *Castilleja linearfolia*, Camp Davis, Jackson, Wyo., July 3, 1940. (Wehm Herb. 1078.)
111. *Pleospora compositarum* Earle, on *Agastache urticaefolium*, S. of Teton Pass, Jackson, Wyo., July 11, 1940. (Wehm Herb. 1121a.)
112. *Pleospora laricina* Rehm, on *Larix*, bei———?, Tyrol, Aug., 1872. Dr. Rehm. (Riksmuseet: Herb. Rehm.) (Type.)
113. *Pleospora nigritula* Rehm inedit., on *Sagina*, Glacier in Dizthal?, Tyrol, Aug., 1875. (Riksmuseet: Herb. Rehm.)
114. *Pleospora compositarum* Earle, on *Umbellifer*, Teton Pass Rd., Jackson, Wyo., June 20, 1940. (Wehm Herb. 1022.)
115. *Pyrenophora ephedrae* Speg., on *Ephedra andina*, Mendoza (Potrerillo), March, 1910 (La Plata Mus. 2184).
116. *Pyrenophora corynis* Clem. inedit., on *Anaphalis margaritacea*, Peak, Colo., Aug. 16, 1907 (Farl. Herb.: Clem. Form. Crypt. Colo. 447).
117. *Pleospora herbarum* var. *microsporum* Sacc., on *Thermopsis divaricata*, Spanish Peaks, Colo., June 20, 1907 (Farl. Herb.: Clem. Crypt. Form. Colo. 443).
118. *Pleospora herbarum* var. *occidentalis* Wehm., on *Spharalcea rivularis*, Hoback Forest Camp, Jackson, Wyo., June 25, 1940. (Wehm. Herm. 1055.)
119. *Pyrenophora hispida* var. *pericomes* Clem., on *Pericomes caudata*, Engleman Canyon, Colo., July 17, 1906 (Farl. Herb.; Clem. Crypt. Form. Colo. 240).
124. *Pleospora proustiae* Speg., on *Proustia ilicifolia*, Cacheuta, Mendosa, Argentina, March, 1909 (La Plata Mus. 2166.) (Type.)

125. *Pyrenophora tragacanthae* (Rab.) Sacc., on *Astragalus microlobus*, Sulphur Springs, Colo., 2400 m., July 22, 1907 (Farl. Clem. Crypt. Form. Colo. 454).
125a. A second fungus.
126. *Pleospora herbarum* (Fr.) Rab., on *Chrysopsis amplifolia*, Ruxton Dell, Colo., 2800 m., Sept. 5, 1905 (Farl.: Clem. Crypt. Form. Colo. 36).
127. *Pyrenophora eriogoni* Earle, on *Eriogonum*, Hermosa, Colo., April 3, 1899, leg. C. F. Baker (N.Y.B.G.: Herb. S. F. Earle: Pl. S. Colo. 62). (Type.)
128. *Pyrenophora chrysospora* (Niessl) Sacc., on *Lupinus argophyllus*, Sulphur Springs, Colo., 2400 m., July 22, 1907 (Farl.: Clem. Crypt. Form. Colo. 445).
129. *Pleospora herbarum* var. *occidentalis* Wehm., on *Lupinus parviflorus*, S. of Teton Pass, Jackson, Wyo., July 11, 1940 (Wehm Herb. 1110a).
131. *P. herbarum* var. *occidentalis* Wehm., on *Agastache urticaefolium*, S. of Teton Pass, Jackson, Wyo., July 11, 1940. (Wehm Herb. 1121d.)
132. *Pyrenophora tetraneuris* Earle, on *Pedicularis hallii*, Togwotee Pass, Moran, Wyo., July 8, 1940. (Wehm Herb. 1096a.)
133. *Pleospora herbarum* var. *occidentalis* Wehm., on *Senecio rydbergii*, Camp Davis, Jackson, Wyo., June 19, 1940. (Wehm. Herb. 1033a.)
134. *Pleospora herbarum* var. *occidentalis* Wehm., on *Penstemon glaber*, Camp Davis, Jackson, Wyo., Aug. 3, 1940. (Wehm Herb. 1201c.)
135. *Pleospora herbarum* var. *occidentalis* Wehm., on *Horkelia gordonii*, Skyline Trail, Teton Nat. Park, Wyo., July 24, 1940. (Wehm. Herb. 1170.)
163. *Teichospora nitida* E. & E., on *Rubus villosus*, Fl. Fayette Co., 1817, Apr. 25, 1895, (N.Y.B.G.: Ellis Coll. 706). (Type.)
167. *Pleospora vulgaris* Niessl, on *Draba lutea*, Red Creek, Jackson, Wyo., July 29, 1940 (Wehm. Herb. 1185a).
169. *Pleospora leguminum* Rab., on *Vicia faba*, Doenitz, leg. Fiedler. (Farl. Herb.: Rab. Herb. Myc. 548.) (Isotype.)
170. *Pleospora oblongata* Niessl, on herbs, Vollwark in Algau, July 3, 1909, leg. Ade. (Riksmuseet: Herb. Rehm.)
171. *Pleospora herbarum* f. *rumicis*, Stralsund, on *Rumex acetosa*, 1869, leg. Fischer. (Riksmuseet: Rab. Fung. Eur. 1332.)
172. Undetermined, on *Festuca rubra* Gottland: Bro., June 17, 1920, leg. T. Vestergren (Rkismuseet: Fung. Succ.).
173. *Pleospora martianoffiana* Thum., on *Clematis vitalbae*, Hittledorf, bei Wien, Sept., 1911, leg. Niseel. (Riksmuseet: Herb. Sydow.)
174. *Pleospora salicorniae* Jaap, on *Salicornia herbacea*, Schleswig-Holstein, Strande bei Norsum, Insel Sylt., Aug. 14, 1912, leg. H. & P. Sydow. (Riksmuseet: Syd. Myc. Germ. 1097.)
175. *Pleospora salicorniae* Jaap, on *Salicornia herbacea*, Schleswig-Holstein, Strandweisen bei Morsum, Insel Sylt., July 23, 1904, leg. O. Jaap. (Riksmuseet: Jaap Fung. exs. sel 111.) (Type.)
176. *Pleospora salicorniae* Jaap, on *Salicornia herbacea*, Thuringen: Salzweisen, bei Aumhule, June 20, 1935, leg. H. Sydow. (Riksmuseet: Syd. Myc. Germ. 2937.)
177. *Pleospora herniariae* Fck., on *Herniaria glabra*, Judensand, Oestrich, Autumn, leg. Fuckel. (Riksmuseet: Fck. Fung. Rehn. 812.) (Type.)
178. *Pleospora gymnocladi* Bagnis, on *Gymnocladus dioica*, Italia centralis; Roma, Autumn, 1875, leg. C. Bagnis. (Riksmuseet: Thuem. Myc. Univ. 563.) (Type.)
179. *Pleospora oligomera* Sacc. & Speg., on *Beta*, Buenos Aires, Argentina, July, 1881, leg. Spegazzini. (La Plata Mus. 2169.)
180. Undetermined, on *Lonicera xylosteum*, ———?, Jan. 2, 1921, leg. T. Vestergren, (Riksmuseet).
181. Undetermined, on *Campanula cervicaria*, Estland, Osel, Arensburg, June 19, 1899. (Riksmuseet.)
182. *Pleospora herbarum* (Fr.) Rab., on *Foeniculum*, Chile: Batuco, Jan., 1909. (La Plata Mus. 7141.)
183. Undetermined, on *Brassica*, Seattle, Wash., Jan., 1947, leg. D. M. McLean. (Wehm Herb.)
184. *Pleospora syringae* Fck., on *Syringa vulgaris*, Oestrich, leg. Fuckel. (Riksmuseet: Herb. Sydow.) (Isotype.)
185. *Pleospora media* Niessl, on *Lobelia tupa*, Chile: Valdivia, Jan., 1909. (La Plata Mus. 2159.)

186. *Pleospora herbarum* f. *meliloti*, on *Melilotus alba*, Montello (Treviso), Sept., 1902 (Riksmuseet: Sacc. Myc. ital. 1042).
187. *Pleospora scopulicola* Speg., on *Draba magellanica*, Ushuwaia, Tierra del Fuego, May, 1882. (La Plata Mus. 2147.) (Type.)
188. *Pleospora herbarum*, on *Aristolochia sipho*, Garten zu Islebiam, Fruhjahr, 1883, leg. Zopf. (Riksmuseet: Zopf. Fl. Isleb.)
189. *Pleospora allii* (Rab.) Ces. & deNot., on *Allium oleraceus*, Trignits in der Prignitz, April 2, 1911, leg. O. Jaap. (Riksmuseet: Herb. Rehm 853.)
190. *Pleospora alstroemeriae* Speg., on *Alstroemeria* sp., Chile: Valparaiso, Jan., 1909. (La Plata Mus. 2185.) (Type.)
191. *Pleospora herbarum* f. *siliquaria* Kze., on *Cheiranthus incana*, Kirchhofe zu Eisenleben (Sachsen), Mar., 1875, leg. Kunze (Riksmuseet: Rehm Asc. 340).
192. *Pleospora proteispora* Speg., on *Rumex* sp., La Plata, Argentina, Aug. 23, 1888. (La Plata Mus. 7239.) (Type.)
193. *Pleospora acaciicola* Henn. on *Acacia macrophylla*, Bot. Gart. zu Berlin, Feb., 1894, leg. P. Hennings (Riksmuseet: Herb. Sydow). (Isotype.)
194. *Pleospora dura* Niessl, on *Leontodon autumnalis*, Wilmersdrofer Wiesen, Berlin, June, 1888, leg. P. Sydow (Riksmuseet: Syd. Myc. March 2036).
195. *Pleospora freticola* Speg., on *Armeria andina*, Gregory Bay, Tierra del Fuego, April, 1882. (La Plata Mus. 2177.) (Type.)
196. *Pleospora meliloti* Rab., on *Melilotus alba*, Elbufer bei Konigstein (Sachsen), April, 1877, leg. Krieger. (Riksmuseet: Rab. Fund. Eur. 2330.) (Isotype.)
197. *Pleospora phragmospora* (Dur. & Mont.) Ces., on *Melia azederach*, Buenos Aires, Sta. Catalina, Argentina, July 18, 1905, leg. Spegazzini. (La Plata Mus. 7176.)
198. *Pleospora sclerotioides* var. *vulgatissima* Speg., on *Baccharis* sp., *Beta* sp., etc., La Plata, Argentina, May, 1881 (La Plata Mus. 2193). (Co-Type.)
199. *Pleospora piptochaeti* Speg., on *Piptochaetum tuberculatum*, La Plata Argentina, Oct., 1894. (La Plata Mus. 2168.) (Type.)
200. *Pleospora australis* (Cke.) Sacc., on herbs, Taupo, Nus. boreal, Nouvae Zelandiae, Dec., 1874, leg. S. Berggren. (Riksmuseet: No. 397.) (Isotype.)
201. *Pleospora socialis* Kze., on *Allium cepa*, Wilmersdorf, Apr., 1883, leg. P. Sydow. (Riksmuseet: Syd. Myc. March 938.)
202. *Pleospora salsolae* Fck., on *Salicornia virginica*, Marblehead, Mass., July 4, 1896, leg. W. G. Farlow. (Riksmuseet: Rel. Farl. 76.)
203. *Pleospora leguminum* Rab., on *Colutea arborescens*, Eiselben, 1879, leg. J. Kunze. (Riksmuseet: Herb. Sydow.)
204. *Pleospora herbarum*, var. *ailanthi* Niessl, on *Ailanthus glandulosa*, Lusitinia, Coimbra, Feb., 1881, leg. F. Moeller. (Riksmuseet: Rhuem. Myc. Univ. 2246.)
205. *Pleospora herbarum*, var. *robusta* Niessl., on *Allium sativum*, Lusitania; Coimbra, May, 1879, leg. F. Moeller. (Riksmuseet: Theum. Myc. Univ. 1845.)
206. *Pleospora insularis* Speg., on *Hierochloa antarctica*, Isla de los Estados, Tierra del Fuego, March, 1882. (La Plata Mus. 2163.) (Type.)
207. *Pleospora herbarum* (Fr.) Rab., on *Iliamna*, Mt. Shasta. Calif., 4500 ft., July 12, 1946, leg. W. B. Cooke, No. 18233. (Wehm. Herb.)
208. *Pleospora herbarum* (Fr.) Rab., on *Pentopanax angelicifolium*, La Plata, Argentina, Oct. 4, 1910. (La Plata Mus. 7145.)
209. *Pleospora herbarum*, var. *fabae* Rab., on *Vicia faba*, Doenitz, leg. Fiedler. (Riksmuseet: Rab. Herb. Myc. 547c.) (Co-Type.)
210. *Pleospora herbarum* (Fr.) Rab., on *Capsana*, Loh bei Gelheim, in Franken, 1866, Dr. Rehm. (Riksmuseet: Herb. Rehm.)
211. *Pleospora acantholimonis* Henn., on *Acantholimon glaucencens*, Bot. Gart. zu Berlin, April, 1900, leg. P. Hennings. (Riksmuseet: Herb. Sydow.) (Isotype.)
212. *Pleospora spegazziniana* Sacc., on herbs, Wildheim?, March, 1875, leg. Rehm. (Riksmuseet: Herb. Rehm.)
213. *Pleospora principis* Pass., on *Phoenix dactylifera*, Liguria, leg. G. Passerini. (Riksmuseet: Herb. Sydow.) (Isotype.)
214. *Pleospora spegazziniana* Sacc., on *Fraxinus excelsior*, Grobizg———?. Harz. 1898. (Riksmuseet: Herb. Rehm.)

215. *Pleospora herbarum* (Fr.) Rab., on *Foeniculum aureus*, Buenos Aires; Flores, Argentina, July 16, 1880, leg. Spegazzini. (La Plata Mus. 7150.)
216. *Pleospora* (*Sphaeria*) *denotata* (C. & E.) Sacc., on *Trilifolium pratense*, Newfield, N. Y., Apr., 1880. (N.Y.B.G.: Ellis coll.)
217. *Pleospora herbarum* (Fr.) Rab., on *Allium*, Doenitz, leg. Fiedler. (Riksmuseet: Rab. Herb. Myc. 1, 547a.) (Co-Type.)
218. *Pleospora evonymi* Fck., on *Evonymus europea*, Hattenheim an der Muhlweize Ostrick (Nassau), leg. Fuckel. (Riksmuseet: Herb. Boissier and Herb. Sydow.) (Type.)
219. *Pleospora triglochonis* Har. & Bri., on *Triglochin palustris*, Gallia: Vic-le-Comte, Avernia, Apr., 1889, leg. Heribaud, comm. Hariot. (Riksmuseet.) (Type.)
220. *Pleospora verbasci* Rab., on *Verbascum*, Gonnos-Fanadiga, Marzo, Un. Itin. crypt., 1866, Dr. Marcucci, with desc. (Riksmuseet.) (Type.)
221. *Pleospora salsolae* Fck., on *Salicornia herbacea*, Sjoll, ved Flaskekroen, May 20, 1889, leg. A. Ratinkier. (Riksmuseet: Herb. Romell, 2 pkts.)
222. *Pleospora pezizoides* Ces., on *Dracaena australis*, Italia, in horto bot. Neapolitano, leg. Cesati. (Riksmuseet: Rab. Fung. Eur. 3352.) (Isotype.)
223. *Pleospora salsolae* Fck., on *Salsola kali*, Freineweinheim (Nassau). (Riksmuseet: Herb. Boiss. 466, Herb. Sydow, & Fck. Fund. Rhen 814.) (Isotypes.)
224. *Pleospora erythrinae* Ces., on *Erythrina crista-galli*, sub dio, in H. B. Neapolitano, leg. Cesati. (Riksmuseet: Rab. Fung. Eur. 2658.) (Isotype.)
225. *Pleospora subsulcata* E. & E., on stems, Lyndonville, N. Y., June 4, 1889, leg. C. E. Fairman. (N.Y.B.G.: Ellis coll.) (Type.)
226. *Pleospora denotata* (Cke. & Ell.) Sacc., on *Trifolium pratense*, Newfield, N. J., June, 1885. (N.Y.B.G.: Fung. Col. 628.)
227. *Pleospora herbarum* (Fr.) Rab., on *Anethum graveolens*, Doenitz, leg. Fiedler. (Riksmuseet: Rab. Herb. Myc. 547d.) (Co-type.)
228. *Pleospora phyteumatis* Fck., on *Phyteumatis spicatum*, Neuchatel, Seitz., Spring, 1887, leg. Morthier. (Riksmuseet: Thuem. Myc. Univ. 1060.)
229. *Pleospora* (*Sphaeria*) *denotata* (Cke. & Ell.) Sacc., on *Trifolium pratense*, Newfield, N. J., April, 1877. (N.Y.B.G.: Ellis coll.) (Type.)
230. *Pleospora puyae* Speg., on *Puya coerula*, Valparaiso, Chile, Jan., 1909. (La Plata Mus. 2170.) (Type.)
231. *Pleospora* (*Sphaeria*) *denotata* (Cke. & Ell.) Sacc., on *Trifolium pratense*, Newfield, N. J., March, 1881 (N.Y.B.G.: N.A.F. 778).
232. *Pleospora dura* Niessl, on *Rumex crispus*, Berlin: Wilmersdorf, May, 1891, leg. P. Sydow. (Riksmuseet: Syd. Myc. March 3151.)
233. *Pleospora herbarum* (Fr.) Rab., on *Bromus*, La Plata, Argentina, Aug. 18, 1942, leg. Lindquist. (La Plata Mus. 7157.)
234. *Pleospora clarkeana* E. & E., on *Plantago maritima*, var. *juncoides*, Magnolia, Mass., Aug. and Sept., 1885, C. H. Clarke. (N.Y.B.G.: Ell. N A F 158 (Type?)
235. *Pleospora herbarum* f. *resedae*, on *Reseda luteola* bei Heigenbrucken, im Spessart, April, 1878, leg. Rehm. (Riksmuseet: Rehm Asc. 486.)
236. *Pleospora herbarum* f. *Humuli*, on *Humulus lupulus*, Bot. Gard. Berlin, Aug., 1886, leg. P. Sydow. (Riksmuseet: Herb. Rehm.)
237. *Pleospora culmicola* Speg., on *Paspalum* sp., Concepcion, Chile, Jan., 1909. (La Plata Mus. 2180.) (Type.)
238. *Pleospora herbarum* (Fr.) Rab., on *Brassica*, Doenitz, leg. Fiedler. (Farl.: Rab. Herb. Myc. 547b.) (Co-type.)
239. *Pleospora herbarum* (Fr.) Rab., on *Lupinus luteus*, Doenitz, leg. Fiedler. (Farl. Herb.: Rab. Herb. Myc. 547e.) (Co-type.)
240. *Pleospora freticola* Speg., on *Culcidium magellanicum*, Wallamatu, Tierra del Fuego, May, 1882. (La Plata Mus. 2178.)
241. *Sphaeria allii* Rab., on *Allium cepa*, Sonnewalde, leg. Kretschmar. (Farl. Herb.: Rab. Herb. Myc. 838.)
242. *Pleospora balsamorrhizae* Tracy & Earle, on *Balsamorrhiza saggitata*, Mancos, 7000 ft., June 24, 1898. (Farl. Herb.: Pl. S. Colo. 1097.) (Isotype.)
243. *Pleospora herbarum* var. *occidentalis* Wehm., on *Pseudomycopterus anisatus*, Hoback Canyon, Jackson, Wyo., June 16, 1940. (Herb. Wehm. 1221.)
244. *Pleospora balsamorrhizae* Earle, on *Polemonium viscosum*, July 16, 1940, Hoback Canyon, Jackson, Wyo. (Wehm. Herb. 1143.)

245. *Pleospora labiatarum* Cke. & Harkn., on *Marrubium vulgare*, Healdsburg, Sonoma, Calif., Apr. 28, 1880, Harkness, No. 1488. (Cal. Acad. Sci. Herb. 1087 & 7285.) (Type.)
247. *Pleospora balsamorrhizae* var. *perseptis* Clem., on *Balsamorrhiza saggitata*, Sulphur Springs, Colo., July 22, 1907. (Farl. Herb.: Clem. Cr. Form. Colo. 439.)
248. *Pleospora maritima* Rehm, on *Triglochin maritima*, Holnie?, Sweden, July, 1907, leg. J. Vleugel. (Riksmuseet: Fung. Scand.)
249. *Pleospora leguminum* Rab., on *Vicia sativa*, Bayreuth, Bavaria, April, 1875, Thuemen. (Riksmuseet: Rehm Asc. 288.)
250. *Pleospora herbarum* (Fr.) Rab., on *Lychnum viscaria*, Dresden, leg. ipse. (Riksmuseet: Rab. Fung. Eur. 768.)
251. *Pleospora armeriae* (Rab.) Ces. & deNot. (sub. *Sphaeria*), on *Armeria vulgaris*, im Saugrunde bei Wolferode unweit Eiselben (Sachsen) im Mai 1873, leg. J. Kunze. (Riksmuseet: Rab. Fung. Eur. 1635.)
253. *Pleospora allii* (Rab.) Ces. & deNot., on *Allium cepa*, Bohmen: Tabor, Apr., 1904, leg. F. Bubak. (Riksmuseet: Migula Kr. Germ., Aust & Helv., 149.)
254. *Pleospora gigaspora* Karst., on *Plantago maritima*, Insel Rom, Strandweisen im Porrenprice?, July 20, 1905, leg. Jaap. (Riksmuseet: Herb. Rehm 267.)
256. *Pleospora maritima* Rehm, on *Triglochin maritima*, Norwegia, Kaafjord, Alten, Aug., 1895. (Riksmuseet: Rehm Asc. 1188 & Vestergr. Micr. rar. sel. 223. (Type.)
257. *Pleospora megalotheca* Tracy & Earle, on *Achillea millefolium*, Bob Creek, La Plata Mt., Colo., 10,500 ft., June 27, 1898. (N.Y.B.G.: Pl. S. Colo. 172.) (TyEe.)
258. *Pleospora colla* Clem., inedit., on *Aster fremontii*, Ouray, Colo., 2400 m., July 13, 1907. (Farl. Herb.: Clem. Dr. Form. Colo. 440.)
259. *Pleospora richtophensis* E. & E., on *Senecio crassulus*, Skyline Trail, Teton Nat. Park, Wyo., July 24, 1940. (Wehm Herb. 1168a.)
260. *Pleospora richtophensis* E. & E., on *Helianthus* sp., N. W. Colo., July, 1897, leg. C. F. Baker. (N.Y.B.G.: N. A. Fung. 3523.)
261. *Pyrenophora ciliata* var. *ecoronis* Clem., on *Gillia pungens*, La Veta, Colo., June 19, 1907. (Farl. Herb.: Clen. Cr. Form. Colo. 446.)
262. *Pyrenophora oedospora* Clem., inedit, on *Machaeranthera varians*, Sulphur Springs, Colo., July 22, 1907. (Farl. Herb.: Clem. Cr. Form. Colo. 451.)
263. *Pleospora richtophensis* E. & E., on *Helianthella?*, Togwotee Pass, Wyo., 10,000 ft., July 8, 1940. (Wehm. Herb. 1100b.)
264. *Pleospora richtophensis* E. & E., on *Achillea millefolium*, S. of Teton Pass, Jackson, Wyo., July 11, 1940. (Wehm. Herb. 1127a.)
264a. Second fungus.
265. *Pleospora richtophensis* E. & E., on *Erigeron salsuginosus*, S. of Teton Pass, Jackson, Wyo., July 11, 1940. (Wehm Herb. 1113b.)
266. *Pleospora richtophensis* E. & E., on *Agastache urticaefolium*, S. of Teton Pass, Jackson, Wyo., July 11, 1940. (Wehm Herb. 1121.)
267. *Pleospora richtophensis* E. & E., on *Osmorrhiza occidentalis* S. of Teton Pass, Jackson, Wyo., July 11, 1940. (Wehm Herb. 1119a.)
268. *Pleospora richtophensis* E. & E., on Umbellifer, Cream Puff Mt., Jackson, Wyo., July 5, 1940. (Wehm Herb. 1084a.)
269. *Pleospora richtophensis* E. & E., on *Senecio* sp., Overlook, Skyline Trail, Teton Nat. Park, Wyo., Aug. 5, 1940. (Wehm Herb. 1208a.)
270. *Pleospora thuemeniana* Sacc., on *Yucca* or *Agave*, Metamoras, Mexico, June, 1895, leg. Dr. Egeling. (N.Y.B.G.: Ellis coll.)
281. Undetermined, on *Sorbus aucupariae*, Upland, Solna, Haga norra grinder, March 9, 1912, leg. T. Vestergren. (Riksmuseet: Fung. Suec.)
321. Undetermined, on *Scorzonera humilis*, Nrk., Orebro, July 15, 1885, leg. L. Romell. (Riksmuseet: Herb. L. Romell 16232.)
322. Undetermined, on *Campanula* sp., Nrk., Orebro, July 15, 1885. (Riksmuseet Herb. L. Romell 16230.)
323. Undetermined, on *Primula veris*, Gtl. Hangvar, Suderbys, June 16, 1896, leg. Maria Romell. (Riksmuseet: Herb. L. Romell 16231.)
331. Undetermined, on *Avena pratensis*, Gottland: Bro, s; n Bro, June 20, 1920, leg. T. Vestergren (Riksmuseet: Fung. Suec.).

333. Undetermined, on *Melica compressa*, Gottland: Bro, June 19, 1920, leg. T. Vestergren (Riksmuseet: Fung. Suec.).
336. Undetermined, on herbaceous stems, Sueciae: Oslandiae, (Skogsby?), June 7, 1888, K. Starback (Riksmuseet).
341. (*Pleospora*), on *Sarothamnus scoparius*, Gtl.: Slite, April, 1907, leg. J. Hamner. (Riksmuseet: Herb. L. Tomell 16194).
342. Undetermined, on *Lolium perenne*, Estl. Eichs i Bro, June 16, 1896, leg. T. Vestergren (Riksmuseet).
343. (*Pleospora*), on *Artemisia rupestris*, Suecia, Gotland, Helvi, 1898, leg. T. Vestergren (Riksmuseet).
344. (*Pleospora*), on *Salix cinerea*, Södermanland: Nacka, Dec. 6, 1920, T. Vestergren (Riksmuseet: Fl. Suec.).
345. Undetermined, on *Lonicera caprifolium*, (Eriks, Bro?), June 18, 1898, leg. T. Vestergren (Riksmuseet).
349. *Pleospora vulgaris* Niessl, on *Circium oleraceum*, Mahr-Weisskirchen, April 11, 1912, leg. F. Petrak. (Riksmuseet: Fl. Boh. & Mor. 123.)
351. *Pleospora armeriae* (Cda.) Ces. & deNot., on *Armeria vulgaris*, Wolderode pr. Oslebiam (Saxony), April, 1875, leg. J. Kunze (Riksmuseet) Kze. Fung. sel. 69.
420. *Pleospora collaltina* Sacc. & Speg., on *Capparis*, Italia: Conegliano, Aug., 1876. (La Plata Mus. 7156: Sacc. Myc. Ven. 922??.)
428. *Pyrenophora subantartica* Speg., on *Veronica serpillifolia*, Ushuaia, Tierra del Fuego, Jan., 1924. (La. Plata Mus. 2197.) (Type.)
439. Undetermined, on *Sorbus aucuparia*, Upland; Solna, s; n, Jarva, March 24, 1912, leg. T. Vestergren (Riksmuseet).
440. *Pleospora infectoria* Fck., on *Secale cereale*, Italia: Conegliana, 1877. (La Plata Mus., No. 7160.)
442. Undetermined, on *Melica nutans*, Gottland: Rostade i Ekeby, Aug. 15, 1897, leg. T. Vestergren. (Riksmuseet: Fl. Suec.)
443. *Pyrenophora freticola* Speg. inedit., on *Perezia recurvata*, Punta Arenas, Argentina, Jan., 1924. (La Plata Mus. 2196.) (Type.)
449a. *Pleospora relicina* (Fck.), on *Secola cereale*, Mahr-Weisskirchen, Stoppelfelde, Feb. 29, 1912, leg. F. Petrak. (Riksmuseet: Herb. Rehm.) Second fungus (*P. infectoria*).
452. *Pleospora media* var. *limonum* Sacc., on orange leave, Corona, Calif., Jan., 1911, Charles Metz, misit Baker. (Riksmuseet: Rehm Asc. No. 1996.)
453. *Scleroplea aurantiorum* Rehm, on orange leaves, Corona, Calif., Jan., 1911, leg. Chas. Metz. (Riksmuseet: Rehm Herb.) (Type.)
479. *Pleospora jaapiana* Rehm, on *Plantago maritima*, Schleswig-Holstein, Insel Rom, July 18, 1904, leg. O. Jaap. (Riksmuseet: Jaap Fung. sel. 112.) (Isotype.)
480. *Pleospora infectoria* Fck., on *Secale cereale*, Mahr-Weisskirchen: Drahotusch, Jan. 29, 1912. (Riksmuseet: Petr. Fl. Boh. & Mor. 120.)
491. *Pleospora media* var. *variabilis*, on *Zygadenus chlorianthus*, Wilderness Park, Mackinaw City, Mich., June 14, 1948. (Wehm Herb.)
492. *Pleospora* (*diaporthoides?*), on *Sueda fruticosa*, Ladhar, Shaikhupura, India, Aug. 16, 1945, leg. S. Ahmad (1415). (Wehm Herb.)
493. *Pleospora herbarum* forma *nepetae* Gz. Frag., on *Nepeta*, prope Est. Alp. de Cercedilla, Aug. 16, 1915, leg. Beltram. (Herb. Jard. Bot. Madrid: Fung. 1682.)
494. *Pleospora escaleriana* Gz. Frag., on *Astragalus florulenti*, prope Khou-Cherri (Persiae), Aug., 1899, leg. Escalera. (Herb. Jard. Bot. Madrid Fung. No. 2568.) (Type.)
495. *Pyrenophora depressa* Pk forma *stachydis* Frag., on *Stachys acerosa*, Prope Ohloas River, Karoum (Persia), June, 1899, leg. Escalera. (Herb. Jard. Bot. Madrid Fung. (1721.) (Type of form.)
499. *Pleospora koun-cherrica* Frag., on *Dianthus fimbriati* subsp. *laevissima*, prope Kouh-Cherrica-Djerri, Persiae, July, 1899, leg. Escalera. (Herb. Jard. Bot. Madrid: Fung. (2577.) (Type.)
500. *Pleospora herbarum*, forma *solidaginis* Frag., on *Solidago virga-aurea* var. *cambricae*, prope Est. Alp. Siete Picos, Aug. 15, 1913, leg. Beltran. (Herb. Jard. Bot. Madrid: Fung. (1380.) (Type of form.)

502. *Pyrenophora silenes* Gz. Frag., on *Silene tejadensis* Boiss., Olohas River, Karoum (Persiae), 1899, leg. Escalera. (Herb. Jard. Bot. Madrid: Fung. No. 1711.) (Type.)
534. *Pleospora richtophensis* var. *pallida* Wehm., on *Ranunculus*, Summit Pass, Blue Mt., Austin, Ore., 4300 ft., June 17, 1948, leg. E. G. Simmons, No. 1374.
536. *Pleospora richtophensis* var. *pallida* Wehm., on *Aster foliaceus*, Burrough's Mt., Mt. Rainier, Wash., 7200 ft., Aug. 20, 1948, leg. E. G. Simmons, No. 1926.
544. *Pleospora herbarum* (Fr.) Rab., on *Guiterrezia sarothoe*, Camp Grounds, Mesa Verde Nat. Park, Colo., 7000 ft., Oct. 19, 1949, leg. W. G. Solheim, #2289.
545. *Sphaeria armeriae* Corda, Czechoslovakia, leg. Corda. (Herb. Krypt. Mus. Nat. Prague; Herb. A.C.I. Corda.) (Type.)
547. *Pleospora richtophensis* E. & E., on *Helianthus* sp., Mt. Richtophen, N.W. Colo., 9000 ft., leg. C. F. Baker No. 238 (N.Y.B.G., 4 pcks.). (Type.)
548. *Pleospora richtophensis* E. & E., on *Helianthus quinquinerva*, Michigan River, Colo., July 24, 1894, leg. C. S. Crandall. (N.Y.B.G.: Ellis coll. No. 73.)
549. *Pleospora richtophensis* E. & E., on *Sidalcea candida*, Bank of Walton Creek, July 11, 1894. (N.Y.B.G.: Ellis coll. No. 76.)

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Type Studies in Dictyosporium, Spiera, and Cattanea[1]

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Dictyosporium was described by Corda in 1836 in Weitenweber's *Beiträge* (4) with the single species, *D. elegans;* and *Speira* was described one year later by the same author (5) again with a single species, *S. toruloides.* Since *Dictyosporium* is best known from its discussion in the *Icones Fungorum* (6), it is to this rather than to the original description that reference will be made here. *Cattanea* was described at a considerably later date by Garovaglio (11) with the single species, *C. hepatospora.* There is, therefore, no question but that these are the type species of their respective genera; and with the descriptions and illustrations in the *Icones* and the illustrations accompanying the original description of *Cattanea,* all three are readily available for comparison. The figures of *D. elegans,* however, are somewhat formalized and leave much to be desired by anyone trying to interpret tham.

At the present time, two of these genera—*Dictyosporium* and *Speira*—are recognized, Penzig (19) and Saccardo (21) having been followed in their reduction of *C. hepatospora* to the synonymy of *S. toruloides.* Saccardo (21) has also been followed in considering spore branch separation in *Speira* and spore branch adherence in *Dictyosporium* as the distinguishing characters of these genera. That this distinction was correct is purely accidental since Saccardo based his interpretation of *Speira* upon the organism Garovaglio had described as is borne out by Penzig's discussion in *Michelia* (19) and by Fig. 904 of the *Fungi Italici,* labelled *S. toruloides,* both of which clearly refer to *C. hepatospora.* Because of this error on Saccardo's part, as shown by studies of specimens unmistakably identical with Garovaglio's fungus and of the type specimen of *Speira toruloides* Corda, a reconsideration of both *Dictyosporium* and *Speira* was deemed advisable to re-establish Corda's concepts of them and to determine the validity of Saccardo's distinction when applied to these genera when correctly understood.

A more recent, and in many ways more correct, statement regarding *Speira* and *Dictyosporium* is to be found in the discussions by Gueguen (12) and Chenantais (3). These authors do not accept the generic value of the distinction mentioned by Saccardo, and have regarded *Speira* as a synonym of *Dictyosporium.* In fact, they point out that such a suggestion was made much earlier by Bonorden (2), but that it never gained acceptance. Although Gueguen made the combination, *D. toruloides* (Corda) Gueguen, it should be noted that both he and Chenantais erred in placing *D. elegans,* the earlier name, in the synonymy of this species. I have agreed with the substance of the

[1]This paper, in its original form, was a portion of a thesis submitted to the faculty of the Graduate College of the State University of Iowa in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

French argument except as noted regarding the synonymy, and have adopted Gueguen's change here. It should be understood, however, that the interpretation of one of these authors (Chenantais) has been based upon specimens which are not in very close agreement with the type specimen of *S. toruloides*. He has presented illustrations of the fungi he studied and they represent specimens found in some European *exsiccati* under the name, *D. elegans*, e.g., *Fungi bavarici* No. *500* and Rabh.-Pazsch. *Fungi europaei* No. *4194* (Fig. 1, A and B). These spores most nearly resemble the spores of *S. toruloides* but are quite unlike those to be found in the type of that species.

A third, and entirely different, interpretation of *Dictyosporium* is mentioned only because it was the view held by myself at the time of a previous report (7). This was based upon specimens possessing large, dark-colored dictyospores which could have been placed in any one of several vaguely defined genera, but which also seemed to bear a resemblance to Corda's formalized illustrations of *D. elegans*. After an examination of the type specimen, I have since been able to identify these with *Sporidesmium concinnum* Berkeley. Lacking type material of *Dictyosporium* and *Speira* it would have been possible to accept any one of these views as correct; but the difficulty was resolved by the loan of two specimens of *D. elegans* and one of *S. toruloides* from the Corda herbarium (20) in Prague. The spores of all these specimens are illustrated in Fig. 1, F, G, and J. The separation of the branches in spores of *S. toruloides*, mentioned by Saccardo, is immediately apparent; but equally obvious is the similarity to *D. elegans* in all other respects. Furthermore, a slight separation of the branches in the spores of *D. elegans* has also been observed, and has been substantiated by examination of other specimens referable to this species. I am maintaining the two species as distinct, though congeneric, because of the similarity in general morphology of their spores; and because the separation of the branches in *D. elegans* is by no means as apparent or as frequently observed as it is in *S. toruloides*. The spores of *S. toruloides* are also more irregular in shape and construction than are those of *D. elegans* which are, in general, flat and composed of parallel rows of cells. With the exception of *S. toruloides*, the species of *Dictyosporium* are characterized by having flat, U-shaped conidia composed of several parallel branches arising from a single basal cell in the cell by cell manner previously described (7). The conidia of *S. toruloides* may be flat or branched in all directions; but even in this species the flat nature of the conidium, if used with reservation, serves as a useful key character. There is some indication that the spores of some specimens bear a resemblance to those of *Thrysidium*, though in all examples studied enough typical conidia have been seen to dispel any doubts with might arise.

The fungus described by Garovaglio as *Cattanea hepatospora* is, in many ways, different enough to warrant separate generic recognition; but because the spores have the same general morphology and are formed in the same manner it is considered a species of *Dictyosporium*. In this I am following Lindau (14) who recognized it as a valid species and not a synonym of *S. toruloides* as Saccardo had done. The spores differ from those typical of *Dictyosporium elegans* in that they are cylindrical rather than flat; and the branches, though coherent, are

independent and easily separable. The cylindrical appearance of the spores is the result of the circular arrangement of the branches around the upper portion of the single basal cell from which they arise in a cell by cell manner. The branches are more regular in form than are those of the spores of *Dictyosporium elegans*, and they are slightly curved and may or may not have constrictions at the septa. They also separate easily when pressure is applied to the coverslip as opposed to the irregular ruptures which appear in the spores of *D. elegans*. A second species described here as new is very close to *C. hepatospora*, differing in having much smaller spores which are slightly less cylindrical in appearance.

Other genera which deserve mention here are *Synphragmidium* Strauss and *Botryosporium* Schweinitz. Both of these have been referred to the synonomy of *Speira* by Saccardo (21). I know *Synphragmidium* only from the original description and from the species attributed to it by Peck (18), *S. effusum*, which I have reduced to the synonymy of *D. toruloides*. I have, therefore, included *Synphragmidium* as a questionable synonym of *Dictyosporium* with the realization that that may not be its ultimate disposition. It is possible to consider *Botryosporium* more thoroughly because the type specimen of *B. prorumpens* Schweinitz has been examined. Schweinitz' generic name is a later homonym of *Botryosporium* Corda, and has been incorrectly referred to the synonymy of *Speira*, following Saccardo. Although the details of this matter are considered later, suffice it to say that it no longer need be regarded as a synonym of either *Speira* or *Dictyosporium*.

Having established the limits of *Dictyosporium* we may now proceed to a detailed consideration of the valid species insofar as material has been available for study.

DICTYOSPORIUM Corda, Weitenweber's *Beiträge* 1: 87. 1836. ill.; also in *Icones Fungorum* 2: 6. 1838. ill.

Speira Corda, *Icones Fungorum* **1**: 9, fig. 140. 1837.
?*Synphragmidium* Strauss, Sturm's Deutschlands Flora iii: VII: **34**: 41. 1853.
Cattanea Garovaglio, Rend, Real. Ist. Lomb., 2 ser. **8**: 125. 1875. ill.

Sterile hyphae within the substratum or sparse on the surface, effuse, hyaline to dark-colored, septate, branching; conidia effuse or in sporodochia; conidiophores reduced to very short branches on assimilative hyphae; conidial branches formed by the division of the termainal cell of the conidiophore in a cell by cell manner, branches multicellular, arising (for the most part) from a single basal cell although sometimes obscurely so, fusing laterally or not at maturity, more or less parallel, usually constricted at septa, rarely slightly incurved at the tips; at maturity flat, dark-colored, usually U-shaped, morphology irregular in one species (*D. toruloides*); sterile setae may be present in one species (*D. chilensis*).

KEY TO THE VALID SPECIES OF DICTYOSPORIUM STUDIED

1. Conidia borne in sporodochia or sporodochioid clumps 2
1. Conidia borne on effuse conidiophores 5
2. Spores flattened, never cylindrical, branches never separating 3
2. Spores typically cylindrical, branches separating easily, tips sometimes "hooked" 4
3. Sporodochia large (0.5–1 mm) spores appearing ovoid, spores approximately 2 times as long as wide . . . . . *zeylanicum*

3. Sporodochia small (less than 0.2 mm), spores approximately as wide as long ..... *polystichum*
   4. Spores large, usually greater than 50 μ in length ..... *hepatosporum*
   4. Spores smaller, less than 50 μ in length ..... *prolificum*
5. Conidia few-branched (1–5), usually 2–3, not separating, spore length usually more than three times width ..... *minor*
5. Conidia many-branched, usually more than 5, not separating, spore length usually not more than two times width 6
   6. Spore not typically flattened, or if flattened having branches which become distinctly separated from one another ..... *toruloides*
   6. Spores typically flattened in front view, branches usually not separating, or only slightly so ..... *elegans*

DICTYOSPORIUM ELEGANS Corda, Weitenweber's *Beiträge* **1**: 87. 1836. ill.[1]

Dictyosporium opacum Cooke & Harkness, Grevillea **12**: 95. 1884.
?*Dictyosporium secalinum* Delacroix, Bull. Soc. Myc. Fr. **7**: 109–110. 1891. ill.

Sterile hyphae usually within the substratum, effuse; conidia U-shaped, 3–9 branched, branches usually parallel, rarely otherwise, usually arising simultaneously, often laterally fused at maturity, tips of branches rarely slightly incurved, multiseptate, constricted at the septa, dark-colored conidia measuring 25–68.5 (–86) x 8–28 (–41) x 6–13 μ.

This fungus appears to have a widespread distribution in the north temperate zone on rotting woody or herbaceous plant material. It is highly probable that it has a greater distribution than is now known.

TYPE LOCALITY: Reichenberg, Bohemia.

It was found after examination of several specimens that there are two spore-size groups within the species, but because they are not clear cut the measurements given above represent those of all specimens assigned here. The measurements of the two specimens from the Corda herbarium were 29–56 x 8–28 x 6–13 μ. The spores illustrated in Fig. 1, F are those of an authentic specimen and those in Fig. 1, G are those of the type. Of the other specimens examined, that collected by Langlois and labelled *D. elegans* (No. *2471* Fig. 1, E) has spores most closely resembling those of the type although the growth is slightly more profuse than is found on the type specimen.

A single specimen has been examined which might possibly be separated as a distinct species. The conidia of this specimen (FH, labelled *S. effusa*, see below) are morphologically identical with those of other specimens of *D. elegans* and agree favorably with the type; but measure 57–86 x 36–41.5 μ, according to a note on the packet by Dr. Linder with which I agree. These spores are larger in all of their dimensions than those of other specimens of *D. elegans*, a fact which has often been warrant enough for describing a new species. I have preferred to leave this specimen under *D. elegans* because spores in this species are formed in a cell by cell manner, a method which, under optimal conditions, might easily allow greater spore growth than is usually encountered. These wider limits of spore dimension have been indicated in parentheses in the description.

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[1](Citation in Saccardo *Sylloge* **4**: 513. 1886. is incorrect); see also *Icones Fungorum* **2**: 6. fig. 29. 1838.

D. opacum Cke. & Hark., as well as the fungus referred to this species by Mangin (15), is regarded as a synonym of *D. elegans*. The spores of the type specimen of *D. opacum* are figured in Fig. 1, H and are in no way different from the type of *D. elegans* or from those of Langlois' specimen. The spores have the same morphology and measure 36.5–57 x 21.5–36.5 μ.

I am referring *D. secalinum* Delacroix (8) to this species as a tentative synonym because there is nothing in the description to distinguish it from the type of *D. elegans*. Delacroix reported this fungus occurring on *Secale* and illustrated it with the conidiophore attached to the distal rather than the basal end of the conidial branches.

SPECIMENS EXAMINED: CZECHOSLOVAKIA (Bohemia): Corda, Reichenberg, 1833 (NMP No. *51536*, TYPE); Corda, Breznia, 1837 (NMP No. *51535*, AUTHENTIC). U. S.: Calif. Harkness, Piedmont, Alameda Co., 1882 (identified as *D. opacum*, CAS No. *2044*, TYPE); La., Langlois, Pointe a la Hache, 1886 (identified as *S. toruloides*, NYBG); Langlois, Pointe a la Hache, 1896 (No. *2471*, NYBG, BPI); N. J., Ellis, 1876 (NYBG); Ellis (No. *2422* identified as *S. toruloides*, NYBG); Mass., Linder, Canton, 1934 (FH, as *S. effusa*).

DICTYOSPORIUM TORULOIDES (Corda) Gueguen, Bull. Soc. Myc. Fr. **21:** 98. 1905. ill.

Speira toruloides Corda, Icones Fungorum **1:** 9. pl. 2, fig. 140. 1837.
Speira oblonga Fuckel, Symbolae Mycologicae, p. 349. 1869. ill.
Synphragmidium effusum Peck, Ann. Rept. N. Y. State Mus. **33:** 27. 1879. ill.
Speira effusa (Peck) Sacc., Sylloge Fungorum **4:** 514. 1886.
Dictyosporium Boydii Smith & Ramsbotton, Trans. Brit. Myc. Soc. **5:** 168. 1915.

Sterile hyphae mostly within the substratum, rarely visible, effuse; conidia more or less U-shaped although very irregularly so in some specimens, composed of 3 to many more or less parallel, much contorted branches; branches usually arising from a single basal cell, branches sometimes secondarily branched, multiseptate, constricted at the septa, separating singly or in groups and sometimes breaking into irregular fragments in microscopic mounts, spores having irregular morphology; *Thrysidium*-type conidia also produced; typical conidia measuring 29.5–89 x 14.5–30 μ, size of conidia often varying with specimen.

This species has been found on several types of decaying, decorticated wood in Europe and North America.

TYPE LOCALITY: Hammerstein, Bohemia.

The type specimen of *S. toruloides* Corda (NMP No. *51537*) has spores measuring 29.5–44.5 x 18.5–30 μ, and those of the type specimen of *S. effusum* Peck measure 37–89 x 14.5–22.5 μ. The conidia of the type specimen of Corda's species are also more noticeably flattened (Fig. 1, J) than those of *S. effusum* (Fig. 1, D), but the two species have been placed together because in both the separation of the conidial branches is quite apparent. For the same reason, *D. Boydii* and *S. oblonga* are also referred to the synonymy of *D. toruloides*, although differentiation would not be too difficult on the basis of the type specimens alone. *D. Boydii* (Fig. 2, I) bears similarities to *S. polystichum* as well as to *D. toruloides*, but is placed here because of the greater size of the spores and because the conidial branches almost always show

FIG. 1. A. conidia of "*D. elegans*," *Fung. bavar.* #500; B. conidia of "*D. elegans*," *Fung. europ.* #4194; C. conidia of *Botryosporium prorumpens* Schw.; D. conidia of *Synphragmidium effusum* Pk.; E. conidia of *D. elegans* coll. by Langlois; F. conidia of *D. elegans* (Prag. #51536); G. conidia of *D. elegans* (Prag. #51535); H. conidia of *D. opacum* Hke; I. conidia of *Sporidesmium concinnum* Berk.; J. conidia of *D. toruloides* (Prag. #51537). (Drawn × 750 approx. reduced ⅛.)

some separation, a character found almost exclusively in *D. toruloides*. *S. oblonga* (Fig. 2, D) is identical with the organism discussed and figured by Chenantais (3), and more nearly approaches the spore morphology of Peck's *S. effusum*, rather than Corda's type. All of these have been placed together because I feel that a broad rather than a narrow interpretation of species limits is desirable, since the most casual perusal of the organisms of this general group should satisfy almost anyone that this is a safer course until such time as we know more about the dematiaceous growths appearing on bark and decaying wood.

SPECIMENS EXAMINED: CZECHOSLOVAKIA (Bohemia): Corda, Hammerstein, 1837? (NMP No. *51537*, TYPE); U. S.: N. Y., Peck, Verona, (no date on packet, TYPE of *S. effusum*, NYM); GREAT BRITAIN: Dumbartonshire, D. A. Boyd, Killermont, Oct. 1914 (TYPE of *Dictyosporium Boydii*, A. L. Smith, BM); SWITZERLAND: Fuckel, Münchau (no date given, TYPE of *Speira oblonga*, HB).

DICTYOSPORIUM ZEYLANICUM Petch, Ann. Roy. Bot. Gard. Peradeniya **6**: 252. 1917.

Cheiromyces digitatus Martin, Jour. Wash. Acad. Sci. **34**: 359. 1944. ill.
Speira digitata (Martin) Damon, Mycologia **42**: 555. 1950.

Sterile hyphae within the substratum, hyaline to dark-colored, thick-walled, sparsely branching; conidiophores aggregated into sporodochia or sporodochioid clumps; conidia dark-colored, flat, U-shaped, lateral branches having incurved distal ends, branches laterally fused at maturity, 3–5 usually 4, 3–9-septate, constricted at septa, measuring 26–40 x 13–25 x 6–10 μ.

This fungus is known from the type and from one other collection. It has been found on a dead branch scattered over the bark and the surface of the stromata of a sterile pyrenomycete in Ceylon as well as on oak wood in a moist chamber in Iowa.

TYPE LOCALITY: Peradeniya, Ceylon.

The sporodochial habit of this fungus, the smaller and the characteristically shaped spores separate this species from the others. It is included here despite its sporodochial habit because it fits into none of the existing genera of the Tuberculariaceae, and the morphology of its conidia is so like that of *D. elegans* that the erection of a new genus would serve no useful purpose. Although some of the sporodochia appear rather large, they are still distinct enough to make the character useful in distinguishing the species.

Two specimens labelled *D. zeylanicum* (*#4368* and *#5519*) from the Kew herbarium have been seen. The type, according to Petch's original description, is *#4368* (Fig. 2, B) and answers the specific description given; but *#5519* is *D. elegans* and not the species to which Petch assigned it. The type and isotype specimens of *C. digitatus* Martin completely agree with Petch's fungus.

SPECIMENS EXAMINED: CEYLON: Petch, Peradeniya, Dec. 1914 (TYPE *#4368* PD, ISOTYPE *#4368* KW); U. S.: Iowa, Martin, Iowa City, 1943 (TYPE of *C. digitatus*, SUI; ISOTYPES, NYBG, FH).

FIG. 2. A. conidia of *D. minor;* B. conidia of *D. zeylanicum;* C. conidia of *D. polystichum;* D. conidia of *Speira oblonga* Fkl.; E. conidia of *Sporidesmium moriforme* Pk.; F. conidia of *D. hepatosporum;* G. conidia of *Speira punctulata;* H. conidia of *D. circinatum;* I. conidia of *D. Boydii;* J. conidia of *D. prolificum;* K. conidia of *Sporidesmium Peziza.* (Drawn × 750 approx. reduced ⅓.)

Dictyosporium polystichum (von Höhnel) comb. nov.
Speira polysticha von Höhnel, Sitz.-ber. Akad. Wien **122**: 49–50. 1913. ill.

Hyphae within the substratum, hyaline to pale fuscous, septate, branching, effuse; conidiophores arranged in sporodochia, reduced to short branches of the vegetative hyphae; conidia dark-colored, branched, branches formed in a cell by cell manner, multiseptate, constricted at the septa, laterally fused, giving the impression of being formed in a mosaic rather than in the typical branched manner, measuring 26–34 x 23–34 μ.

This species is known only from the type collection on rotting stems of *Senecio*.

TYPE LOCALITY: Sonntagsberg, Lower Austria.

The mosaic appearance of the spores (Fig. 2, C), the fact that the branches are never very long (15–16 cells at most), and the irregular arrangement of the branches are what distinguish this species. In most of the spores observed, the branches are not exactly opposite as in the other species, but arise at slightly different levels from one another, thus contributing to the general impression of a mosaic given by the conidia.

SPECIMEN EXAMINED: AUSTRIA, Strasser, Sonntagsberg, 1910 (TYPE, FH).

Dictyosporium minor (Saccardo) comb. nov.
Speira minor Saccardo, Michelia **2**: 559–60. 1882. *Fungi Italici* Fog. 905.

Sterile hyphae within the substratum, fuscous to dark-colored, effuse; conidiophores reduced to short branches of assimilative hyphae, sometimes in sporodochia; conidia single and terminal, arising in a cell by cell manner from the distal ends of the branches; branches 2–4 (usually 2), parallel or subparallel, 5–9-septate, not noticeably constricted at the septa, only slightly incurved at the distal ends, separating with difficulty; conidia dark-colored, measuring 21.5–37 x 7.5–11 μ.

Found on rotting bark and wood of various trees.

TYPE LOCALITY: Montello, Italy.

The unusual 2–3–branched condition of the conidia (Fig. 2, A) with their slightly incurved tips and the growth from their basal ends serve to distinguish this species. Although it has been reported only a few times, I believe it is rather common and can be demonstrated in specimens of many wood- or bark-inhabiting dematiaceous fungi. Although the branches of these spores do not appear to become laterally fused at maturity, they do not separate as easily as do the branches of *D. hepatosporum*.

SPECIMENS EXAMINED: U. S.: *Va.*, Nuttall, Fayette Co., 1894 (AUTHENTIC ?, NYBG).

Dictyosporium hepatosporum (Garovaglio) comb. nov.
Cattanea hepatospora Garovaglio, Rendic. Real. Ist. Lombardi, 2 ser. **8**: 125. 1875. ill.
Speira toruloides sensu Saccardo *non* Corda, Sylloge Fungorum **4**: 514. 1886.
Speira hepatospora (Garovaglio) Lindau, *in* Rabenhorst's Kryptogamen-Flora von Deutschland, Österreich und Schweiz. **1** (8): 201. 1907.
?*Speira cymbidii* Verplancke, Med. Landbouw. Opz. Ghent **3**: 57. 1935. ill.

Sterile hyphae within the substratum, effuse, dark-colored; conidiophores reduced, arranged in sporodochia; conidia dark-colored, thick-walled, branched branches curved, often incurved with a "hook" at the terminus of each branch, multiseptate, constricted at the septa or not, branches more or less isodiametric, cells of branch approximately 5 x 5 μ; conidia having an ovate appearance under low magnification, branches separating easily upon the application of pressure, measuring 63.5–86 x 22–29 μ.

This fungus is found on rotting or decaying wood and other plant parts.

TYPE LOCALITY: Pavia, Italy.

This species is usually distinguished by the distinct "hook" at the distal ends of branches of mature spores, the ovate appearance of the spores, the ease with which the branches separate, and the size of the conidia. Conidia of this species are illustrated in Fig. 2, F.

As indicated above, *D. hepatosporum* has heretofore been referred to as *S. toruloides*. *Speira cymbidii* Verplancke is included only as a tentative synonym of *D. hepatosporum* because the type specimen has not been seen; but the description and the accompanying figure of this species indicate the probable identity of the two species.

SPECIMENS EXAMINED: U. S.: Calif., Stout, Sacramento, 1940 (labelled *S. toruloides*, BPI); Ore., Zeller, (labelled *Speira rubicola*, in herb. NYBG).

Dictyosporium prolificum sp. nov.

Hyphae steriles et fertiles in substrato immersae, conidiophora rare visibilia, sporodochiis disposita, subepidermalia, erumpentia, maculas nigras fere 0.1 mm. diam. gerentia, conidia cylindrica, 30–50 x 15–30 μ, pallide fusca, ramosa, ramis 3–8 parallelis ex una cellula basali orientibus, cellulis productis, multiseptata (5–9 septis), non constricta, isodiametrica, discreta, contactu discedentia.

Habitat cum Didymellae specie in Junci caulibus emortuis.

Sterile and fertile hyphae within the substratum, conidiophores usually not visible, arranged in sporodochia, subepidermal, becoming erumpent, forming black spots approximately 0.1 mm in diameter; conidia pale olivaceous microscopically, having a more or less cylindrical shape, branched, 3–8 in number, arising from a single basal cell, parallel or subparallel, multiseptate with 5–9 septa, not constricted at the septa, isodiametric, independent, separating easily upon the application of pressure; measuring 30–50 x 5–7 μ.

Found on dead stems of *Juncus* in association with a species of *Didymella*.

TYPE LOCALITY: Vineland, New Jersey.

The smaller spores and the fact that the branches are not incurved at their apices separates this species from *D. hepatosporum*, and the larger number of branches and a lack of constrictions at their septa distinguish it from *D. minor*. That it does not belong in *Cheiromyes* is evident from the illustrations of its spores in Fig. 2, J. Ellis had placed the specimen in his herbarium as *Cheiromyces prolifica*.

SPECIMENS EXAMINED: U. S.: N. J. Ellis, Vineland, 1883 (TYPE, NYBG No. *2396*).

SPECIES INQUIRENDAE ET EXCLUDENDAE

SPEIRA CHILENSIS Spegazzini, An. Mus. Nac. Buenos Aires **11**: 194. 1910.

Hypophyllous; conidiophores aggregated on spots; conidia composed of 2–6 parallel, 6–9–septate branches, dark-colored, measuring 20–25 x 4–5 μ (referring to a single branch, considered to be a spore by Spegazzini).

Found on rotting leaves of *Aetoxicum punctatum* at Cerro Caracol de Concepcion, Chile.

This description has been abbreviated from the original and from notes on the packet of the type specimen. Although a close search of the type material was made, no fungus answering Spegazzini's description could be found. The mention of sterile setae, included in the original description, has been omitted here because there is more that a reasonable doubt that they are connected with the *Speira*. Spegazzini's illustrations strongly suggest that his fungus is a synonym of *D. elegans*, although the smaller size of the spores might argue for its distinctness.

SPECIMENS EXAMINED: CHILE: Concepcion, Spegazzini, 1909? (TYPE, NMA).

SPEIRA PUNCTULATA Cooke & Ellis, Grevillea **7**: 6. 1878.

Sporodochia small, punctiform, black, sunken in the center, approximately 1 mm. in diameter; conidia subglobose to sarciniform, fuscous when examined microscopically, muriform, with cells arranged so as to have the superficial appearance of being in parallel rows, measuring 16.5–26 x 14–18.5 μ.

Found on decorticated stems of *Vaccinium* at Newfield, N. J.

The isotype of this species has been examined and the spores are illustrated in Fig. 2, G. When examined uncritically, they bear a vague resemblance to spores of the *Dictoysporium*-type, but are found to be muriform upon closer study. A more exact disposition of this fungus might be in *Coniosporium sensu* Mason & Hughes, but I hesitate to make such a proposal in view of the present lack of understanding of that genus.

SPECIMEN EXAMINED: U. S.: N. J., Ellis, Newfield, 1878 (No. *2884*, NYBG).

SPEIRA ERUMPENS (Schweinitz) Saccardo, Sylloge Fungorum **4**: 516. 1886. *lapsus calami.*

Botryosporium prorumpens Schweinitz, Trans. Am. Phil. Soc. n.s. **4**: 306. 1832. ill.

Saccardo's combination was based upon the single species in the genus, which has not been reported since its description. *Botryosporium* Schw. is a later homonym of *Botryosporium* Corda (Sturm's *Deutsch. Fl.* 3: 11: 9, 1831, fig. 5, not as cited by Saccardo, Sylloge *4*: 54. 1886.), and has generally been referred to the synonymy of *Speira* following Saccardo (21). Examination of material of Schweinitz's species preserved in the Michener collection makes it necessary to re-evaluate the status of the fungus. Spores of the type illustrated in Fig. 1, C were found, and appear to be of the general type found in *Stemphylium*

to the synonymy of which *Botryosporium* Schw. probably should be relegated.

SPECIMEN EXAMINED: U. S.: Pa., Schweinitz, Bethlehem, (TYPE, BPI).

DICTYOSPORIUM YERBAE Spegazzini, An. Mus. Nac. Buenos Aires **12**: 138. 1909. ill.

The type specimen of this fungus has been studied, and the conidia are morphologically identical with those of *Sporidesmium moriforme* Peck (17) and with those recently described by Hughes (13) for *Sporidesmium paradoxum* Corda (=*Coniosporium paradoxum* (Corda) Mason and Hughes). This has been confirmed by an examination of Peck's type and by examination of a specimen kindly sent to me by Mr. Hughes. It is also identical with conidia of the fungus described by Schweinitz (23) as *Sporidesmium nitens*. Conidia of the type of *S. moriforme* Peck are presented in Fig. 2, E. Although the conidia of *D. Yerbae* and *S. paradoxum* are, in general, of slightly smaller size than those of *S. moriforme;* I do not believe these differences great enough to maintain the species as separate especially in view of their unusual spore morphology. Saccardo (22) added to the synonomy of this fungus by describing a variety, *ampelinum*, of *S. moriforme;* and Ellis and Harkness (10) described a separate species, *Sporidesmium Rauii*. The following specimens have been examined and their spore measurements given:

Sporidesmium moriforme Peck
TYPE 30.5–39.5 x 18.5–23.5 μ.

Sporidesmium moriforme var. *ampelinum* Sacc. & Sacc.
AUTHENTIC 25.5–35 x 15.5–30 μ

Sporidesmium Rauii Ellis and Harkness
TYPE 29.6–65 x 16.5–25 μ

Dictyosporium Yerbae Spegazzini
TYPE 25.5–30 x 14.0–30 μ

Sporidesmium paradoxum Corda (from Hughes, 13)
16–37 x 12–32 μ

Sporidesmium nitens Schw.
TYPE 23.5–46.5 x 16.5–21 μ

That Hughes' interpretation of *S. paradoxum* is correct has been confirmed by his examination of Corda's type specimen (personal communication from S. J. Hughes), and all of the above named species could be referred to it as synonyms were it not that *Sporidesmium nitens* Schw. antedates Corda's name. Unfortunately, final disposition of these names must await clarification of *Coniosporium* since Hughes (1933) transferred *S. paradoxum* to that genus as *Coniosporium paradoxum* (Corda) Mason and Hughes. This usage of *Coniosporium* was complicated by the fact that *Sporidesmium peziza* Cooke and Ellis was transferred to *Coniosporium* at the same time, and it is questionable that these two species can be considered congeneric with *C. olivaceum* Link, the type species. *C. olivaceum* produces dark-colored, opaque, rough-walled dictyospores borne singly on the conidiophore whereas

the spores which I have observed in the isotype of *S. peziza* are borne in chains. These are illustrated in Fig. 2, K, and resemble spores of the type known for *Sirodesmium* if that genus can be re-established. In any event, I do not believe that *S. nitens* (=*S. paradoxum*) can be considered congeneric with *S. peziza* as Hughes implies, and it is questionable that it is congeneric with *C. olivaceum*, so that final disposition must await more complete studies on dictyosporous Dematiaceae.

SPECIMENS EXAMINED: U. S.: N. Y., Peck, Sandlake, 1873 (TYPE of *S. moriforme*, NYM); Zabriskie, Flatbush, 1889 (No. *109*, NYBG); N. J., Ellis, Newfield, 1889 (NYBG); Kansas, Bartholomew, 1894 (NYBG); Penn., Schweinitz, Bethlehem, *3082*, (TYPE, ANS); ITALY: D. Saccardo, Trevisio, 1904 (AUTHENTIC, NYBG); ARGENTINA:Spegazzini, San Pedro, 1907 (TYPE of *D. Yerbae*, NMA); U. S.: N. J., Ellis, (as *Sporidesmium Peziza* C. & E., NYBG, ISOTYPE).

DICTYOSPORIUM CIRCINATUM Cooke & Harkness, Grevillea **12**: 95. 1883.

The type which, to my knowledge, is the only specimen of this fungus has been examined, and on this basis the species is excluded from *Dictyosporium*. The conidia show vague similarities to spores of some the helicosporous fungi (as pointed out by the original authors), but not enough to include it among them; and they are not those of a *Dictyosporium* as is evident from Fig. 2, H. It is, however, identical with the fungus described by Ellis and Everhart (9) as *Sporidesmium inquinans;* as it is the older of the two names, the specific epithet, *circinatum*, will have to be used in any new combination. No proposal is made here for the reasons stated previously. A description of the type specimen of *D. circinatum* is included for the use of other workers.

Sterile hyphae mostly within the substratum, effuse, hyaline to pale fuscous; conidiophores lacking, conidia borne on short branches of the assimilative hyphae singly and terminally; apparently formed by the enlargement and division of the terminal cell of the conidiophore, cells of spore arranged in a vague helicoid fashion, multicellular, subglobose to ovate, measuring 25.5–32 x 18.5–25.9 μ.

The type specimen is on decorticated wood of *Platanus racemosa*.

TYPE LOCALITY: Sunol, California.

SPECIMEN EXAMINED: U. S.: Calif. Harkness, Sunol, 1881 (TYPE, CAS).

SPEIRA (CATTANEA) PELAGICA Linder, Farlowia **1**: 407, 1944. ill.

This species, believed to belong to the *Cattanea* section of *Speira*, was isolated from driftwood at Provincetown, Mass. and appears to belong to the dictyosporous, dematiaceous hyphomycetes. It does not belong in *Dictyosporium* in the sense in which that genus is considered here; but I hesitate to alter its generic assignment at this time.

The type and an authentic specimen of *S. pelagica* have been examined, and nothing can be added to Linder's complete description (1). I differ, however, with his disposition of the fungus in that I do not believe it to be in any way similar to species here assigned to *Dictyosporium*. It is true that the spores upon which he based his generic assignment answer in a rather general way the descriptions of

Cattanea, but they show no similarity to the spores of *C. hepatospora* as that species is now understood. Furthermore, I did not find the spores of the type Linder described as being at all numerous; there was by far a greater number which would agree better with the description of *Coniosporium sensu* Mason & Hughes. The fungus is unquestionably one of the *Coniosporium-Sporidesmium* complex, but removal to another genus must await a more thorough study of its numerous and poorly understood species.

SPECIMENS EXAMINED: U. S.: Mass., Barghoorn, Provincetown, July, 1942 (TYPE, FH); Barghoorn, Provincetown, 1943 (AUTHENTIC, FH).

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Cercosporella in Washington[1]

Wm. Bridge Cooke[2] and Charles Gardner Shaw[3]

In the State of Washington several leaf spot diseases are caused by species of *Cercosporella*. Four previously described species of this genus were based on material originally collected in this State. Specimens are infrequently collected because the hosts are wild plants of little economic importance, and because the lesions caused by some species of this genus are inconspicuous. Species occurring on members of the Gramineae are not included in this paper since they have been adequately treated elsewhere.[4] With one exception (*C. idahoenis*) these descriptions are based on specimens filed in the herbarium of the Department of Plant Pathology, The State College of Washington (WSC-PP). Additional specimens of *Cercosporella aceris*, *C. columbrina* and *C. nivosa* were loaned by D. P. Rogers, New York Botanical Garden (NYBG). Specimens of Ellis and Everharts' Fungi Columbiani are located at both institutions.

1. Cercosporella aceris Dearn. & Barth., Mycologia **9**: 362. 1917.

Spots conspicuous, light brown in the center to dark brown or blackish at the margin, orbicular, 2–3 cm. in diam., concentrically zoned; margin definite to rather indefinite and merging with normal leaf tissue, becoming confluent; conidiophores 10–25 x 4 μ, hyaline, in a compact mass up to 100 μ in diam., easily removable in mounting; spores 75–150 x 3–4 μ, multiseptate, acicular, hyaline.

host: *Acer macrophyllum* Pursh

Specimens examined: *Washington:* type-Duckabush River, Aug. 6, 1912, E. Bartholomew, (Fungi Columbiani #5005); Renton, King Co., Aug. 8, 1894, C. V. Piper, (WSC-PP #904); Puyallup, Pierce Co., Oct. 1, 1916, A. Frank, (WSC-PP #15893).

C. V. Piper sent the specimen he had collected at Renton to J. B. Ellis. Ellis gave it the herbarium name "*C. albopuncta.*" It is also filed under the name of "*C. albopunctata.*" Both these names are attributed to Ellis although they were never published.

The "hyphae" mentioned by Dearness and Bartholomew appear to be broken, immature spores.

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[4]Sprague, R. Diseases of Cereals and Grasses in North America. Ronald Press Co., New York. 538 pp., illus. 1950.

2. CERCOSPORELLA ALNI Dearn. & Barth., Mycologia **9**: 362. 1917.

Spots blackish, marginal, sporulation epiphyllous, appearing as grey-white, punctate areas on the blackened leaf tissue; spores 300–350 x 6–8 μ, hyaline, multiseptate.

HOST: *Alnus rubra* Bong.

Specimen examined: *Washington:* TYPE-Bremerton, Sept. 9, 1912, E. Bartholomew, (Fungi Columbiani #5006).

3. CERCOSPORELLA CANA (Pass.) Sacc., Michelia **2**: 364. 1882.

Spots emarginate, grey to blackish-brown, between midrib and margin or covering entire leaf; spores hyaline, multiseptate, 55–75 x 3–4 μ.

HOST: *Conyza canadensis* (L.) Cronquist (=*Erigeron canadensis* L.).

Specimen examined: *Washington:* Deep Canyon, Spokane River, Spokane Co., Sept. 25, 1948, C. G. Shaw and Mary Haferkamp, (WSC-PP #19913).

4. CERCOSPORELLA HELIANTHELLAE Ell. & Ev., Bull. Tor. Bot. Club **24**: 473. 1897.

Spots angular, 1–5 mm. in diam., limited by the veins, light brown, finally becoming confluent over much of the leaf; conidiophores hypophyllous, fasiculate, white, 15–28 x 2–3 μ; conidia hyaline, 1–3 septate, fusiform to filiform, straight, obtuse at the base, variable in length, 16–35 x 2.5–4 μ, a few up to 60 μ or more in length.

HOST: *Helianthella uniflora* (Nutt.) Torr. and Gr. var. *douglasii* (T. & G.) Weber.

Specimen examined: *Washington:* Kamiak Butte, Whitman Co., May 29, 1949. W. B. Cooke (#25193), (WSC-PP #29319).

5. CERCOSPORELLA IDAHOENSIS Sacc., Nuovo Giorn. Bot. Ital. **27**: 85. 1920.

Spots amphigenous, irregularly circular, 5 mm. broad, sordid ochraceous, scarcely marginate; spore production areas hypophyllous, white, gregarious; conidiophores fasciculate, filiform, weakly tortuous, 30–40 x 2 μ, subcontinuous, hyaline; conidia cylindric, from 35–40 x 3.5–4 μ, 3–5 septate, up to 70–85 x 3.5–4 μ becoming attenuate, obtuse at the base, hyaline.

HOST: *Smilacina sessilifolia* (Baker) Nutt.

No specimen of this species was available for study at Pullman. The above description was abstracted from Saccardo, Sylloge Fungorum **25**: 745. 1931. The species was based on a specimen sent to Saccardo by J. R. Weir from Spokane, Washington.

6. **Cercosporella geranii** sp. nov.

Maculis irregularibus, marginalibus, brunneis vel atro-brunneis, lutescentibus marginatis, 1–2 cm. diam.; conidiophoris hyalinis, fasciculatis, ex ostiolo stomatum erumpentibus, 10–20 x 3–5 μ, 0–1 septatis; sporis rectis curvulisve, hyalinis, 1–3 septatis, 36–54 x 3.5–4.5 μ.

Hab. in foliis vivis *Geranii viscosissimi.*

Spots irregular, marginal, brown to blackish-brown, with yellow margins, 1–2 cm. in diam.; conidiophores hyaline, in loose to crowded

groups appearing through stomata, 10–20 x 3–5 μ, 0–1 septate; spores straight to curved, hyaline, 1–3 septate, 36–54 x 3.5–4.5 μ.

HOST: *Geranium viscosissimum* F. and M.

Specimen examined: *Washington:* TYPE—Kamiak Butte, Whitman Co., July 20, 1948, C. G. Shaw and A. C. Goheen, (WSC-PP #19945).

EXCLUDED SPECIES

1. ENTYLOMA COMPOSITARUM Farl., Bot. Gaz. **8**: 275. 1883.

Syn.: *Cercosporella columbrina* Ell. & Ev., Bull. Tor. Bot. Club **27**: 578. 1900.

Spots orbicular, whitish to yellowish from below, becoming light tan at the center from above, 1–4 mm. in diam., becoming confluent; chlamydospores hyaline to very light yellow, spherical to subspherical, 9–12 μ in diam.; conidiophores 22–30 x 2 μ, hyaline, apically roughened; conidia filiform, hyaline, straight or slightly curved, 35–55 x 2–3 μ.

HOST: *Erigeron peregrinus* (Pursh) Greene

Specimen examined: *Washington:* (TYPE of *Cercosporella columbrina*) Blue Mountains, Columbia Co., July 17, 1899, R. M. Horner (#1354), (NYBG, WSC-PP #915).

Ellis evidently did not see the chlamydospores embedded in the host tissue. Although not apparent until the host tissue was crushed or sectioned, chlamydospores were abundant in every lesion from which we made mounts. The conidia found on this specimen are somewhat longer than those usually encountered on specimens of *Entyloma compositarum*, otherwise this specimen agrees very well with that species.

2. **Ramularia nivosa** (Ell. & Ev.) comb. nov.

Syn.: *Cercosporella nivosa* Ell. & Ev., Proc. Phila. Acad. Nat. Sci. **1895**: 438. 1895. *Ramularia pentstemonis* W. B. Cooke, Mycologia **41**: 604. 1949.

Spots scattered, occasionally becoming confluent, orbicular, white at the center, margin reddish to blackish purple, 1–5 mm. in diam., in some specimens indefinite, brown, 2–3 cm. in diam.; conidiophores hyaline, straight to flexuous, septate, occasionally branched, somewhat geniculate, variable in length, 15–30 x 3 μ, emerging from the stomata, forming pulvinate masses up to 50 μ in diameter, conidia hyaline, 8–36 x 2–4.5 μ, 0–3 septate, apically pointed, produced terminally in chains.

Specimens examined: *Washington:* Host: *Pentstemon venustus* Dougl.: Waitsburg, Walla Walla Co., May, 1900, R. M. Horner (#1469), (Fungi Columbiani #1521). *Idaho:* TYPE—Host: *Pentstemon ovatus* Dougl.: Latah Co., June 2, 1894, C. V. Piper (#297), (WSC-PP #777). Host: *Pentstemon confertus* Dougl.: North of Potlatch, Latah Co., June 16, 1948, R. Sprague and C. G. Shaw, (WSC-PP #28630); Sec. 13, R. 5 W., T. 40 N., Latah Co., July 22, 1948, C. G. Shaw and A. Goheen, (WSC-PP #25329). Host: *Pentstemon* sp. Clearwater Canyon, E. of Lenore, Nez Perce Co., W. B. Cooke (#23539), (WSC-PP #24990). *California:* Host: *Pentstemon shastensis* Keck (TYPE of *Ramularia pentstemonis* W. B. Cooke): Wagon Camp Meadows, Mt. Shasta, Siskiyou Co., July 18, 1947, W. B. Cooke (#20307).

Assuming that the dividing line between *Ramularia* and *Cercosporella* is the presence in the latter genus of acicular or scolecosporous spores

whose ratio of length to breadth is 10: 1 or greater, all of this material is referable to *Ramularia*.

Ellis and Everhart (l.c.) cited two specimens at the time *Cercosporella nivosa* was described: "On leaves of *Pentstemon Digitalis*, Ohio. Morgan No. 414, and on *P. ovatus*, Idaho. Piper, No. 297." We have been unable to locate a portion of the Ohio collection made by Morgan. It is not present in the Morgan Collection at the State University of Iowa (fide G. W. Martin), the Ellis Collection at the New York Botanical Garden (fide D. P. Rogers), The Mycological Collections at the Bureau of Plant Industry, Beltsville, Maryland (fide J. A. Stevenson), nor at the Commonwealth Mycological Institute at Kew (fide G. R. Bisby). We, therefore, designate the Piper collection (#297) made in Idaho as the type collection of *Cercosporella nivosa* Ell. & Ev.

It is possible that the spore measurements given by Ellis and Everhart ("12–25 x 1.5–2 μ") were based on the Morgan collection. We find the spores in the Piper collection to measure 15–25 x 2–3 μ, and hence fitting better into *Ramularia* than into *Cercosporella*. Measurements from the other collections cited extend the spore measurements to those given in the description above.

There is considerable variation in the lesion produced. In the type specimens of both *Cercosporella nivosa* and *Ramularia pentstemonis* the spots are definite and circular, measure up to 5 mm. in diameter, are white at the center and bordered with a blackish to reddish purple margin. The Horner collection exhibits the opposite extreme, the spots being indefinite, brownish in color, up to 2–3 cm., somewhat concentrically zoned at the center, and lacking a distinct colored margin. However, the collection from Nez Perce Co., Idaho (WSC-PP #24990) contains leaves with both kinds of lesions, and sporulation is present on each.